the Skeptical Inquirer

SHROUD SCIENCE

A Special Critique
Miracles, Myths, and Misinformation

ALSO

The Creationist Threat
Zodiac and Personality: An Empirical Study

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the Skeptical Inquirer

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2 NEWS AND COMMENT

The Creationist Threat / Vitamin B-15 / Oxford Debates UFOs / CSICOP Policy Statement / Debunking in Denmark / ASPR Predictions

12 PSYCHIC VIBRATIONS

SPECIAL CRITIQUE ON THE SHROUD OF TURIN

15 The Shroud of Turin: A Critical Appraisal, *by Marvin M. Mueller*
35 Shroud Image Is the Work of an Artist, *by Walter McCrone*
37 Science, the Public, and the Shroud of Turin, *by Steven D. Schafersman*

ARTICLE

57 Zodiac and Personality: An Empirical Study, *by Michel Gauquelin*

BOOK REVIEWS

68 Harley D. Rutledge, *Project Identification: The First Scientific Field Study of UFO Phenomena* (Robert Sheaffer)
70 Laurence D. Gadd and the Editors of The World Almanac, *The Second Book of the Strange* (George Fergus)

72 SOME RECENT BOOKS

73 BOOKS IN PROGRESS

74 ARTICLES OF NOTE

FOLLOW-UP

76 Quantum PK Experiments: Reply to Hyman, *by C. E. M. Hansel*

79 FROM OUR READERS

Letters from Bob MacQuarrie, Barbara Lazerson, Bernard J. Sussman, and Anne Hessey

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News and Comment

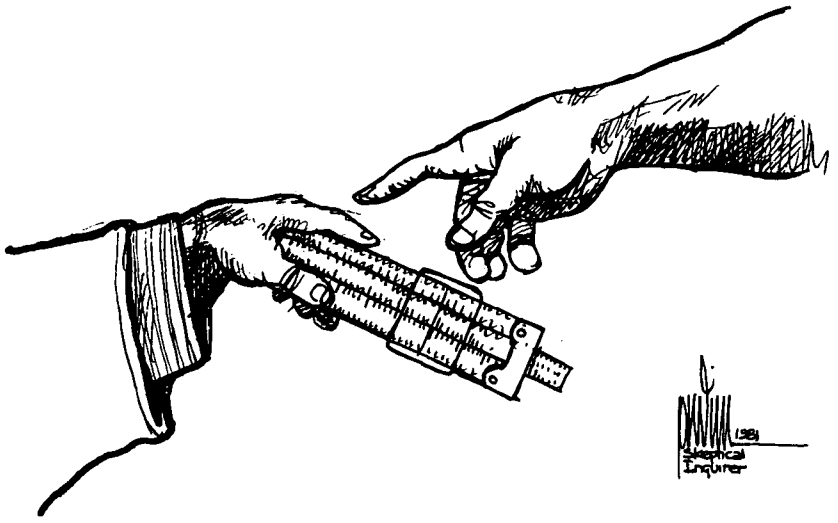
The Creationist Threat: Science Finally Awakens

After several years of steadfastly hoping the creationists' campaign against the teaching of evolution would simply go away, it appears that the scientific community has finally realized it is going to have to become actively involved in countering the threat.

Two years ago most scientists' references to the efforts of the creationists had a cloistered, ivory-tower tone. A scientist concerned about creationist distortions might mention in a journal that evolution is not a "theory" but a "fact." Immediately colleagues would criticize him on arcane, semantic grounds, invoking all manner of abstract in-house arguments about the meaning of such words from the most remote reaches of the academic philosophy of science. Meanwhile the creationists gleefully gathered more kindling to burn evolutionary principles at the stake. Other scientists, leading the new cause of punctuated evolution, would write long articles proposing that evolution is not gradual but occurs in discrete sudden jumps or steps, but they would fail to emphasize adequately to lay readers that their dispute involved only the way evolution occurs and not the agreed-upon fact that it does occur.

Now all that has changed. Scientists are beginning to come down out of the clouds and prepare to do battle. The threat to science and science education is more real than they had imagined. The creationists have demonstrated extraordinary tenacity and political canniness and muscle. Arkansas and Louisiana have passed bills essentially requiring the teaching of creation in science classes that teach evolution. Arkansas' law was overturned in January, but 20 other states still have similar measures in the works. Discussion of evolution in textbooks has been watered down or eliminated.

Even more ominous to science than the state-level bills is the proposed federal legislation. A model bill being heavily promoted by creationists would require the National Science Foundation and all other federal funding agencies to award funds to "creationist scientist research applicants" in the same amount as they do to "evolutionist scientist research applicants." It would also require that federal funds given to museums, including the Smithsonian Institution, for exhibits "that deal with the origin of the universe, the earth, life, or man" be matched by equal federal funds to "creation-science exhibits or museums." On October 21, Congr. William E. Dannemeyer (R-Calif.), who considers evolution a



religion, introduced a bill that would limit Congressional funding of the Smithsonian's National Museum of Natural History if it continues to ignore creationist alternatives to evolutionary theory.

Scientists and other concerned citizens are now beginning to mount some semblace of a coordinated reaction. The highly publicized trial in December to hear the suit by the ACLU and other plaintiffs against the Arkansas creationist law has been the most visible thrust in the counteraction against the new creationist challenge. Prominent scientists, as well as religious leaders, testified against the law and on behalf of the validity of evolution. On January 5, Federal District Judge William Overton overturned the law. He said that creation science "fails to meet" any of "the essential characteristics of science" and that the law "was simply and purely an effort to introduce the biblical version of creation into public school curricula."

Harvard's Stephen Jay Gould, who testified at the trial, called Overton's ruling "a wonderful decision."

Even before the trial, two separate meetings, one organized by the National Academy of Sciences and one by the National Association of Biology Teachers, were held in Washington to discuss the creationist threat.

An article about these meetings by Roger Lewin in *Science*—the first in an excellent series by him—reflected the new mood of active concern. The tone of above-it-all complacency has disappeared. Some comments by participants:

William Mayer, director of the Biological Sciences Curriculum Study in Colorado: "The whole structure of science is under attack. And it's not just biology that's in danger, it's all of science: geology, physics, astronomy."

Maxine Singer, NIH biologist and organizer of the NAS meeting: "This is an extremely important issue. ... Scientists have a crucial part to play in supplying relevant information to people directly involved."

Thomas Jukes of the University of California at Berkeley (in reference to a call by the Institute for Creation

Research to have members turn in the names of teachers who are teaching evolution or preventing the teaching of creationism in schools): "These are terrorist tactics. The creationists are working at all levels. We can't afford to ignore them any longer."

William Carey, executive officer of the American Association for the Advancement of Science: "We are very concerned about creationism."

A National Academy of Sciences spokesman says the Academy decided at its Council meeting in August that the organization should do something. Its new president, geophysicist Frank Press, who was President Carter's science adviser, is very concerned about the creationism problem. The Academy decided to prepare an *amicus curiae* brief on behalf of the legal effort to rescind the Arkansas pro-creationist bill.

The October meeting at the NAS recommended that the Council of the Academy consider producing a booklet promulgating the basic facts of evolution in a short, simple, and attractive presentation. The NABT meeting also considered the need for what was called a "handy creationism refuter" that assembles the relevant facts and arguments from various scientific fields in easily usable form.

"I think something will come out of it," biology educator Stanley Weinberg told the SKEPTICAL INQUIRER, "but exactly how much, I don't know." He said he hoped the meetings would indeed result in more than just talk. Weinberg, a retired biology teacher, author of the text *Biology: An Inquiry into the Nature of Life*, and coordinator of the Iowa Academy of Science's Panel on Controversial Issues, is national coordinator of a network of state "coordinating committees" on evolution. At least 42 states and two Canadian provinces now have such committees, and their memberships have been growing rapidly. These groups have been carrying out the fight on behalf of the teaching of evolution at the state and local levels, where most of the action has been.

"The creationists are still better organized," says Weinberg, "but we're beginning to fight back with some effect." He estimates that perhaps a few thousand scientists are now concerned and active in public education about evolution and in politicking about the creationist threat. "That's a lot more than there was. We're beginning to have an effect, a small effect, but an effect nevertheless.... What we are doing was really invented by Andrew Jackson—local politicking. It isn't new, but it hasn't been done by scientists before."

An illustration of the effectiveness of a well-organized citizens' group concerned about the excesses of creationists was revealed recently in Kentucky. The school board of Fayette County (which includes Lexington) was being formally pressured by a creationist group to make equal time to creationism mandatory. A University of Kentucky anthropologist, Eugenie Scott, helped organize a broad-based group to fight the creationist proposition. It was known that the board was split—two for the proposal and two against it. The swing voter was a member of a fundamentalist church. The key pro-evolution witness was a minister.

A participant in this meeting later described what happened: "The Rev. Edward Hopper read off a list of 71 clergymen who opposed the introduction of creationism into the schools, and their church affiliations! As the reading proceeded, the room got stiller and stiller, until you could hear the proverbial pin drop. When Rev. Hopper finished, there was a tremendous burst of applause." At the

completion of testimony, the fundamentalist swing voter retired to meditate. When the vote took place, his vote defeated the creationist proposal. As Weinberg says, "The clergy are our strongest allies!"

Weinberg's comment makes an important point. It is a mistake to portray the creation-evolution dispute as purely a religion versus science issue. Many people are religious to some degree, but only a small fraction of them feel the need to base their religious beliefs and values on a literal interpretation of Scripture, especially on historical and scientific matters, or to impose their beliefs on others. And it is wrong to assume that only science and scientists have a stake in the pro-evolution issue. An even broader issue is the responsibility of the schools to teach our very best understanding of the way our world works. All members of the community—parents, teachers, business leaders, clergy, as well as scientists—are and should be concerned about that, and all should be brought into these discussions.

Other news on the evolution-creation front:

Many excellent articles have begun appearing in science and general-interest periodicals. A year or so ago, the typical article would take a neutral stance, giving the arguments of both sides. This created the misleading impression that their contentions were essentially equally valid factually and intellectually. Now many articles frankly support evolution and free scientific inquiry and are openly critical of creationist misstatements. (See "Articles of Note" in this issue, p. 74, and in recent issues.)

One hundred thousand copies of the special section on creationism in the December 1981 *Science 81* are being given to the National Science Teachers Association for distribution to its members.

At least a dozen books by scientists and science writers dealing with the creation-evolution controversy are in press or in progress. (See "Books in Progress," this issue, p. 73.)

The AAAS annual meeting in Washington, January 3-8, 1982, had two well-attended sessions dealing with scientific and social issues of evolution and belief.

The Shroud of Turin

Readers have expressed more interest in the Shroud of Turin in the past two years than in any other subject and have been asking us to critique the reports and results of the scientists studying the shroud. We wanted to wait until the work was completed and the results and claims were on record. That is now the case.

A large part of this issue of the SKEPTICAL INQUIRER is therefore devoted to critical analyses of this work and of the claims that have been made about the shroud. Physicist Marvin Mueller presents a critical examination of the entire subject. Steven Schafersman provides a detailed essay-review of the books *The Shroud of Turin* and *Verdict on the Shroud* and the *Harper's* article "Shreds of Evidence" and examines many other issues surrounding the shroud. Analytical chemist Walter McCrone summarizes his conclusions based on his study of particles from the shroud. We think these reports represent a significant and much-needed critical evaluation of the subject.

We will return to our usual format in our next issue.

THE EDITOR

At the AAAS business meeting on January 4, the Board of Directors passed a resolution opposing forced teaching of creationist beliefs. "Because 'Creation Science' has no scientific validity it should not be taught as science . . . The AAAS views legislation requiring 'Creationist Science' to be taught in the public schools as a real and present threat to the integrity of education and the teaching of science." The AAAS urged citizens, educators, and legislators to oppose the compulsory teaching of creationism. When Judge Overton overturned the Little Rock creationist law on January 5, AAAS's Carey praised the decision but added, "We cannot relax."

Scientific and intellectual communities respond to external threats with far less aggressiveness and political adroitness than do many other groups. But they are now awake and beginning to see the creationism movement not as an inconsequential annoyance but as a serious threat to basic values of science and intellectual inquiry. To those of us interested in the foibles of fringe-science, belief in astrology, UFOs, or psychic forces is a positively benign influence compared with the political and educational menace posed by the on-rushing creationist movement.

"With creationism in the saddle," says Isaac Asimov, in his article on the creationist threat in the *New York Times Magazine* (June 14, 1981), "American science will wither. We will raise a generation of ignoramuses ill-equipped to run the industry of tomorrow, much less to generate the new advances of the days after tomorrow.

"We will inevitably recede into the backwater of civilization, and those nations that retain open scientific thought will take over the leadership of the world and the cutting edge of human advancement."

—*Kendrick Frazier*

Dr. Atkins and B-15: Deception on the Diet Front

The American Council on Science and Health has issued a statement criticizing "deceptive and misleading statements" and "practices of questionable value and safety" in Robert Atkins's best-selling book *Dr. Atkins' Nutrition Breakthrough.* It specifically called into question his promotion of the substance incorrectly called vitamin B-15.

In a news release, ACSH Executive Director Elizabeth M. Whelan stated: "Dr. Atkins's claims for the so-called vitamin B-15 have no scientific basis. It disturbs me to see a member of the medical profession making such inaccurate statements. There is no scientific evidence to support claims that the substances called B-15 are beneficial to human health or effective in treating any human illness. They may not even be safe for human consumption."

The news release quoted Victor Herbert, director of the Hematology and Nutrition Laboratory at the Bronx Veterans Administration Medical Center: "B-15 is definitely not a vitamin. It isn't even a single substance. The pills in a bottle labeled 'B-15' contain anything the seller chooses to put in them. Some of the substances found in samples from these bottles may be hazardous to health. Atkins's claims for B-15 are typical of his book, which is full of deceptive and misleading statements promoting practices of questionable value and safety."

The American Medical Association's Council on Foods and Nutrition had already labeled Atkins's low-carbohydrate diet as "without scientific merit,"

The ACSH backed up its news statement with a 12-page booklet, "'Vitamin B-15': Anatomy of a Health Fraud." It refers to the B-15 episode as a

"hoax" and laments that consumers have been taken in by sensationalized claims for the substance (such as in a March 1978 *New York* magazine article), apparently unaware that there is a "total lack of scientific evidence supporting claims that B-15 is either safe or effective."

The booklet also contains an invaluable section called "B-15 and the Hallmarks of Quackery." Recognizing that it is often very difficult for consumers to recognize health and medical quackery, it lists a number of ploys used in the marketing of worthless remedies and treatments:

- Exploitation of people's natural fear of disease and uncertainty about orthodox medical treatment.
- Promise of painless treatment and good results.
- Claims of miraculous scientific breakthroughs.
- Simpleton science (arguing that most diseases have one cause and can be cured by one pill).
- The Galileo ploy (promoters comparing themselves to Galileo, Einstein, Pasteur, and other scientists whose theories were initially rejected).
- The conspiracy theory ("the establishment is out to get us").
- The moving target (shift in arguments and claims as expediency dictates).
- Reliance on testimonial evidence (using unsupported statements by prominent celebrities about "miraculous cures" to cover up lack of scientific evidence).
- Appeals to "freedom of choice."

"The B-15 story is a classic example of the kinds of consumer health frauds that plague society," the ACSH booklet concludes. It urges consumers to "recognize that there are no such things as fountains of youth or miraculous health foods. The best ways to maintain your health and prevent disease are those based on common sense: don't smoke, eat a balanced and varied diet, maintain desirable weight, exercise regularly, consume alcohol in moderation if at all, and have regular medical checkups."

The American Council on Science and Health, a nonprofit educational association promoting scientifically balanced evaluations of food, chemicals, and health, has become quite active in the past two years in combatting food-fad claims. In a sense, it seems to be striving to do for health-fraud matters what CSICOP does for paranormal claims—bring some common sense and critical analysis to the subject. In fact, its 61-member board of scientific advisors includes William T. Jarvis and Stephen Barrett, co-chairmen of CSICOP's new Paranormal Health Claims Subcommittee. ACSH has offices in New York City and Washington, D.C., as well as New Jersey, where further information and the B-15 booklet can be obtained for $2.00. Write ACSH, 47 Maple St., Summit, NJ 07901.

—*K.F.*

Oxford Union Debates UFOs

The world's most prestigious debating society, the Oxford Union of Oxford University, England, chose the night before Halloween to debate the proposition that UFOs are extraterrestrial spacecraft. In the paneled debating chamber, filled with an audience of more than 300, the pro-UFO motion was proposed by Timothy Good, an independent UFO researcher and pro-

fessional musician who has written a book about the late George Adamski, one of the best-known "contactees," who claimed to have talked with visitors from Venus. Good claimed from his own researches that the residue of cases that remain unexplained after investigation is 30 percent.

Attributes of "real" UFOs, he said, were phenomenal speed and maneuverability and the ability to stall cars—petrol driven but not diesel, it seems. What's more, reports of unidentified submarine objects have come from every ocean in the world, according to Good.

UFOs range in size from 3 inches to several thousand feet across, he stated. They have been seen by highly qualified witnesses whose testimony would be accepted by any court of law—astronomers, airline crews, and military personnel. According to Good, the U.S. military classifies UFO reports *above* Top Secret, and he claimed that security forces have gone to great lengths to confiscate samples of UFO fragments.

He showed slides of alleged UFOs, some of which brought laughter from the audience, although Good seemed convinced of their authenticity. He claimed that 1,500 landings had been recorded worldwide, accompanied by landing marks, fragments, and physiological effects on humans, Good told the audience that he had examined claims of hundreds of close encounters of the third kind, which clearly left him convinced that aliens had made contact with humans.

Opposing the motion, David Simpson of the National Physical Laboratory described a UFO hoax he had perpetrated at Warminster, Wiltshire, which had fooled the leading magazine *Flying Saucer Review* and the French astrophysicist Pierre Guerin (see SKEPTICAL INQUIRER, Spring 1980). He also reported eyewitness reactions—"It out-maneuvered any known aircraft"; "It was brighter than any man-made light"—that had been engendered by a 3-volt torch-bulb suspended from a small balloon.

I then outlined the general case against UFOs, explaining that exemplary observers, such as U.S. presidents and airline pilots, can be mistaken. I reported on Allan Hendry's fruitless search for good evidence among 1,300 cases phoned in to the Center for UFO Studies; I disputed the existence of a government cover-up; and I outlined weaknesses of the Betty Hill abduction story. "By studying UFOs, we will learn not about extraterrestrial life or interstellar travel, but about human nature," I concluded.

Supporting Good's motion, aviation historian Charles Gibbs-Smith, a consultant to *Flying Saucer Review*, urged the audience to consider parapsychological explanations. He seemed blissfully unconcerned that the motion specifically referred to the extraterrestrial hypothesis.

In addition, various students spoke on both sides.

At the Oxford Union the audience votes by passing through the relevant half of a swinging door marked Ayes and Noes, which they can do as they leave at any time during the evening: tellers keep count of the numbers passing through each side. In many cases the choice of door seemed somewhat arbitrary, so not too much weight should be placed on the outcome of the vote. Nevertheless, the motion was defeated by 151 votes to 125.

—Ian Ridpath

Ian Ridpath, author of Messages from the Stars *and editor of the* Encyclopedia of Astronomy and Space, *is a member of the U.K. section of CSICOP.*

Policy on Sponsoring Research, Testing Individual Claims, and Conducting Investigations of Alleged Paranormal Powers and Phenomena

The following policy statement was approved at the annual meeting of the Executive Council of CSICOP in Toronto, October 22-24, 1981.

The Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) receives many requests from individuals and groups who want us to investigate their claims, accept challenges they propose, sponsor research on an issue that concerns them, or otherwise become involved in active research. It would be impossible, even for an organization with much greater resources, to properly act on even a fraction of these requests. Besides, organizations, as such, rarely conduct research. Rather, individual members of the organization and groups may do so, but without committing the body as a whole to the outcome. The Parapsychological Association, for example, whose membership is restricted to individuals carrying out research on psychic phenomena, does not itself either carry out research or endorse the findings of its individual members. In the same spirit CSICOP encourages its members, as well as qualified others, to test claims and carry out research, but as a body it does not conduct such activities itself, nor will it generally endorse the findings and conclusions of its members.

1. CSICOP, as a body, does not directly engage in the testing of psychics, research on paranormal phenomena, or investigations on related matters.

2. But CSICOP does encourage such research by its individual members and qualified others.

3. When appropriate, CSICOP is willing to act as a clearinghouse for requests about individual claims of alleged paranormal happenings if they seem to merit such attention. To this end, CSICOP will try to refer such requests to individuals and groups who may be interested in acting upon them and have the qualifications to do so.

4. CSICOP is also willing to provide help, within the context of its limited resources, to investigators in planning, executing, and reporting their results.

5. Such help and encouragement does not constitute an endorsement of the competence of the investigators, the particular design of the study, the actual results, or the conclusions drawn from them.

6. This policy is not meant to preclude more active involvement of CSICOP in research in the future if resources become more abundant.

7. Publication in the SKEPTICAL INQUIRER or elsewhere does not constitute endorsement of a study or of its findings by CSICOP.

Summary

In other words, CSICOP will try, within the context of its limited resources, to be a catalyst for competent research on the paranormal, but it cannot conduct the actual research itself, nor can it be held responsible for the quality and outcome of the investigation.

Debunking in Denmark

Denmark joins the list of countries now producing a periodical critically analyzing fringe-science claims. *Skeptica,* subtitled "A critical forum for off-beat literature and pseudoscience," began publication in the second half of 1981. It is edited and produced by a group of Danish librarians from the Royal School of Librarianship in Aalborg.

The current issue (no. 2) contains editorials, columns, interviews, a profile of Martin Gardner, an article on off-beat claims from England, an analysis of the Danish edition of Berlitz and Moore's *The Roswell Incident,* and critical reviews of Steiger's *The Star People,* Bray's *The UFO Connection,* Roberts and Gilbertson's *The Dark Gods,* Gooch's *The Secret Life of Humans,* and Wilson's *The Directory of Possiblities.*

The address of *Skeptica* (which is published in Danish) is Postboks 8026, DK-9220, Aalborg Ost, Denmark.

—*K.F.*

Predictions at ASPR: Psi Research at the Top

The *American Society of Psychical Research Newsletter* has been looking a good deal like the *National Enquirer* these days. The kind of guesses anyone might make are transformed into apparent specific predictions by the use of irrelevant details.

According to a news item in its October 1981 issue, "psychic" Alex Tanous predicted that a very famous rock-star would have an untimely death and that this death would affect the consciousness of many people. No time was specified. The "prediction" read that the star *might* be foreign-born though living in America, and the reporter adds the "significant" fact that the prediction was given in August 1980 at the ASPR headquarters, *which is in full view of the Dakota Apartments* where John Lennon lived, and that *someone else* in the room, an interviewer, thought of Lennon when he made up a list of six people to whom the prediction *might* apply.

The specific that a rock-star would die an untimely death (the prediction does not even specify that it will be an *unnatural* death), coupled with the comment that the star *might* be foreign-born and living in America (which may have been accompanied by other "might be" statements) has been put forth as a dramatically precise prediction of the shooting of John Lennon in December 1980. Why the added details are relevant are not explained. Even psychic-gawkers do not consider physical proximity to be relevant to successful predictions, nor what other people in the room may have thought.

Even more ridiculous is an article in an earlier issue of this newsletter, also about Tanous, entitled "Assassin's Shadow Disrupts Experiment." The article relates how, on November 5,

1980, the day after Ronald Reagan's election, Tanous supposedly stopped a "regular out-of-body experiment" in which he was participating to say that he saw three future events—the article calls these three "startling" predictions: that a gun will be pointed at President Reagan some time or another, that he will look down while descending some steps, and that the *New York Times* will run a headline some time or another that says "Reagan Wins." Even the reporter was unable to find that headline. The closest he could come was a *Times* headline five weeks later that read "The Reagan Victory." On that same day, the local paper in Tanous's hometown of Portland, Maine, said, "Reagan's Project Wins Big." "Between the two headlines," contended the article, "that's close enough to call a hit."

With the ASPR trumpeting as successes such vagaries as this, who upholds the standards of careful research?

—*Frank B. Dilley*

Professor Dilley is chairperson of the Department of Philosophy at the University of Delaware.

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Psychic Vibrations

Pages 102 and 103 of *The Roswell Incident*, by Charles Berlitz and William L. Moore, which purports to tell of crashed flying saucers in New Mexico, show what appears to be a small humanoid creature, wearing a breathing apparatus, in the custody of U.S. military personnel. The origin of the somewhat fuzzy photo was unknown, although it "reportedly first surfaced in Wiesbaden, Germany, in the late 1940s." The authors stop short of firmly endorsing the photo as proof of saucer crashes, labeling it "Alien from Another World, or Elaborate Hoax?" but they plainly intend the reader to consider it as possibly corroborating the stories in the book. However, West German researcher Klaus Webner, writing in the British publication *The Probe Report*, says he has found the origin of the photo. According to Webner, the April 1, 1950, issue of the newspaper *Wiesbadner Tagblatt* carried a humorous article about flying saucers over Wiesbaden. A UFO was said to have crashed, and a crew member was supposedly in "protective detention." Two U.S. Army men were photographed walking with a small boy, but the image of the child was airbrushed to look like a "man from Mars," with an elongated head and just one leg leading down to a round foot. Another photo purports to show flying saucers cavorting over the marketplace in the town. So successful was the story at pulling the reader's leg that the paper had to publish a denial of the story two days later. The photo and the story somehow made their way to the files of the FBI in the United States, where it was eventually obtained by UFO researchers under the Freedom of Information Act. From there it was but a short hop into the book by Berlitz and Moore.

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According to the *Weekly World News*, the world speedboat champion Ken Warby has had an out-of-body experience—while traveling at 300 mph over the water! "Everything around me disappeared and I was outside myself. It lasted about 10 to 15 seconds. I was both in the cockpit and out of the cockpit, watching myself," Warby reported. Now we have nothing against out-of-body travel, but we firmly believe that such trips are best taken while sitting in one's living room, *not* when there is the danger that the physical body might be destroyed before the astral self can return to it.

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We have all seen the Viking photos of Mars that seem to show pyramids and a giant face, but free-lance writer Barron

Kemp, of Hempstead, Texas, has discovered many previously unsuspected features. Many huge pipes have been seen protruding from the Martian surface, and the head and neck of an immense "hairy monster" is seen jutting out of a crevice, Also noted are a "sawed-off tree-stump" and two dogs, a terrier and a spaniel. Perhaps the most remarkable feature is a "miles-high statue of Donald Duck." Mr. Kemp has been careful to secure the copyright for his findings, to prevent anyone else from claiming credit for their discovery.

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UFO entrepreneur Gray Barker, owner of the Saucerian Press, has proclaimed to his readers in bold headlines, "Immense Hollow Earth Cover-Up Shattered!" He explains that "the existence of the Hollow Earth has been the subject of a vast cover-up, both on the part of world officialdom and the UFOnauts themselves." The author of a new book on the subject, Flora Benton, said "mind control" was "being widely used" to hush up certain people who "talked too much." (One of those who has been talking the most on the subject is Britain's Eighth Earl of Clancarty, Brinsley LePoer Trench, who is responsible for the interest in UFOs on the part of the House of Lords. Perhaps his distinguished title has kept him from being among the legion of the silenced.) Barker is willing to risk incurring the wrath of the silencers for $7.95 a copy. Laugh if you will, but wily old Gray Barker would not have been churning out this stuff for the past twenty-five years if there wasn't a constant stream of willing buyers.

* * * * *

We have reported before on Bigfoot and Bighead, and now it is Skunkfoot

who joins their company. A 7-foot monster, described by *The Globe* as having "an unbelievably bad case of body odor," has reportedly been terrifying the residents of Chesapeake, Virginia, near the Great Dismal Swamp, where the creature presumably resides. One man who claims to have seen it a dozen times says, "To give you an idea of how bad it smells, imagine falling into a cesspool up to your shoulders." To make matters worse, the tabloid *Weekly World News* adds that the creature is "amorous," causing local women to "live in terror." One witness, Sherry Davis, says that she thinks the creature is attracted to women. "Maybe it oozes out of the swamp at night and goes prowling the woods looking for a female," hypothesized another terrified resident. Almost all of the witnesses have been women, prompting Mrs. Davis to add that she is afraid to walk alone now, for fear of being "carried off into the woods by that thing."

* * * * *

The *Wall Street Journal* reports that the cable television company Videography is planning to offer to its subscribers a series called "Satellite Seances," which is billed as a "responsible forum for psychic and occult phenomena." Each week the show will feature six guests along with "one of the world's most renowned mediums," who will attempt to place the guests in touch with the spirits of departed loved ones. Predictions of the future will also be available, and the producers plan to offer follow-ups on long-term predictions that have previously been made. (Our suspicion is that only a minuscule number of the predictions—successful ones—will be brought up again before the cameras.) They also plan to set up a telephone bank to take messages "presumably for the dead."

* * * * *

The world's foremost UFO researcher, J. Allen Hynek, has been in the public eye again recently because of his article in the July 1981 issue of MIT's *Technology Review,* in which he calls once again for increased scientific respectability for the UFO phenomenon. Citing Niels Bohr, Henry Norris Russell, and Lewis Carroll, Hynek woos his highly literate audience with analogies tying in UFOs with science and literature. One metaphor uses the Cheshire Cat from *Alice in Wonderland,* which like a UFO "appears almost out of nowhere," is reported to "materialize" and "dematerialize," etc. "Alice's cat," Hynek observes, "had only one witness," but about two-thirds of UFO reports involve two or more witnesses. However, as an alert reader has pointed out, when the Cheshire Cat appeared on the Queen's croquet grounds, "quite a large crowd collected round it."

—*Robert Sheaffer*

The Shroud of Turin: A Critical Appraisal

Public statements about research on the shroud have been replete with misinformation. Contrary to many claims, human artifice has not been eliminated as a possible method for forming the shroud image. Artifice, in fact, is the most tenable explanation.

Marvin M. Mueller

Science is done for diverse reasons. In common with most other human enterprises, it is done by individuals having a great variety of motives, and unalloyed "truth for its own sake" is not always paramount. The main marvel of modern science is that useful, reliable, predictive knowledge *eventually* emerges from a chaos of contradictory opinions. These opinions are held by researchers who are all too obviously encumbered by common human frailties, such as fallibility. For this reason, science in its self-correcting aspect needs, and thrives on, open, uninhibited airing of divergent opinions. Such will be the spirit of this critique.

Early in the four-century history of modern science, a dominant motive for doing "natural philosophy" was usually cut from the cloth of "natural theology"—worshipping the Creator by studying and understanding his handiwork. Later, and certainly in our time, material utilitarianism has become the most conspicuous motive for carrying out the

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difficult, tedious, and costly experimental procedures required.

In any event, it would be surprising to find in these times a fairly large, well-funded, well-organized program of experimentation with predominantly theological motivations. (The Creation Science Research Center in San Diego does not have an experimental program.) Yet, for several years now, such an enterprise has been subjecting a most famous relic, the so-called Shroud of Turin, to an impressive panoply of scientific tests. I present here the view of an outside scientist concerning the present status and the implications of this unusual application of forensic science. I am moved to do this primarily by the half-truths and even gross distortions concerning the results, and their implications, that have recently been reported in newspapers, on television, and in several books.

Early Attitudes of the Present Investigators

My interest in the complex international shroud investigation was kindled on Good Friday 1978. My local newspaper, the *Los Alamos Monitor,* carried a long front-page story about four local scientists who were taking part in the investigation. Three of the four made scientifically irresponsible statements concerning the matter. A similar story, citing the preconceptions of other investigators on the team, was given national distribution by the wire services. A few quotations by the local scientists before they had seen the shroud will suffice:

> I am forced to conclude that the image was formed by a burst of radiant energy—light, if you will. I think there is no question about that.
>
> What better way, if you were a deity, of regenerating faith in a skeptical age, than to leave evidence 2,000 years ago that could be defined only by the technology available in that skeptical age.
>
> The one possible alternative is that the images were created by a burst of radiant light, such as Christ might have produced at the moment of resurrection.
>
> I believe it through the eyes of faith, and as a scientist I have seen evidence that it could be His [Christ's] shroud.
>
> The most important thing is that any data we obtain should be interpreted through the twin communities of the eyes of the Church and of the scientific community.

In fairness, I hasten to add that these Los Alamos scientists would not make the same statements today. Nowadays they are considerably more cautious and guarded. Indeed, the Los Alamos investigators (with one exception) are now known for being, relatively speaking, the most skeptical of the whole nationwide STURP (Shroud of Turin Research Project)

organization. (Nevertheless, some of the leaders among the national membership do still espouse views similar to the early ones I have quoted.) In any event, it was public statements like these that motivated me to appoint myself as devil's advocate to the shroud investigation.

In October 1978, some thirty American scientists, along with a smaller number of Europeans, spent five days in Turin, Italy, in an intensive round-the-clock experimental study of the famous shroud. The Americans brought with them more than six tons of sophisticated equipment to perform a careful, prescheduled program of observations and tests. Never in all history has a religious relic been subjected to such thorough scientific scrutiny.

About a year later, a flood of news releases and television shows indicated that the shroud's authenticity was just about established. An Associated Press report on November 20, 1979, stated: "The scientist who led the team that investigated the Shroud of Turin last year says evidence so far indicates that the linen did in fact wrap the crucified body of Jesus Christ." The report quoted the scientist: "All of us who were there, at least all of those I talked to, are convinced that the burden of proof has shifted. The burden is now on the skeptic. ... Every one of the scientists I have talked to believes the cloth is authentic."

Then, just before Easter in 1981, the ABC-TV network show "20/20" gave a detailed presentation on the shroud investigation lasting more than twenty minutes. It left the impression that, in the opinion of the researchers, the shroud is authentic. One leading STURP scientist on the show said, "The likelihood of this being a forgery is less than one in ten million, in my opinion." And so it has been for more than four years now: the views of STURP members have nearly completely dominated the media.

The celebrated interpretation that the shroud image is a scorch formed by a burst of radiation emitted by the corpse obviously requires nothing less than a miracle. Not only would the source of the radiation be unprecedented, but the radiation emanating vertically from every element of the body surface would somehow have to be collimated to project an image and would also have to fall off to zero intensity at about two inches—properties totally unknown to science.

Science developed originally as an oasis of rational naturalism in the vast desert of superstition and supernaturalism that had existed since primitive times. It became a unique attempt to explain the observed world in its own terms—that is, without introducing supernatural forces. In all history, science has never been forced to resort to a supernatural or miraculous hypothesis to explain a phenomenon. Thus I wondered what unique observations, what total failure of naturalistic hypotheses, could have driven these men to embrace such a momentous break with scientific tradition?

From the 1350s, when the shroud first appeared on the stage of history—exhibited in a church at Lirey in north-central France—to the

present flurry of scientific activity, this most revered of all relics has played the central role in controversies of many kinds. The whole story is multifaceted and fascinating, but it is much too complex to be discussed in detail here. It is, however, readily available to anyone willing to do some reading. I particularly recommend the sources cited in [1], [2], and [3]. The *Proceedings* [1] gives considerable early scientific details in general and is the best place for details of the radiation-scorch hypothesis in particular. It also gives the general tone and motivation of the organizational meeting of STURP held in Albuquerque in March 1977. The orientation of Ian Wilson's book [2] is more historical, but it also gives considerable scientific detail about the radiation-scorch hypothesis. For excellent color photographs as well as many more-recent results, see the *National Geographic* for June 1980 [3]. However, the most thorough and up-to-date summary of recent experimental results, along with numerous historical and personal anecdotes, is to be found in the November 1981 *Harper's* [4]. This article is lengthy, detailed, and generally factual. It is, however, frequently slanted in diverse ways in favor of STURP and its views, so the overall impression it leaves of the present status of the shroud investigation is misleading.

The Shroud Before 1898

By 1357 the Lirey cloth, proclaimed to be Christ's burial shroud, was being exhibited frequently for fees to large crowds of pilgrims from all over, when a skeptical French bishop named Henri de Poitiers launched an investigation into its provenance. As reported by Henri's successor, Bishop Pierre d'Arcis, the result was that the exhibitions were stopped. But three decades later they started again, prompting Pierre to write a lengthy letter [2] to Clement VII, the Avignon Pope, to counter "the contempt brought upon the Church" and the "danger to souls." The famous letter—the earliest known written reference to the shroud—begins (in translation):

> The case, Holy Father, stands thus. Some time since in this diocese of Troyes the Dean of a certain collegiate church, to wit, that of Lirey, falsely and deceitfully, being consumed with the passion of avarice, and not from any motive of devotion but only of gain, procured for his church a certain cloth cunningly painted ...

Pierre then describes the image on the cloth, which we today call the Shroud of Turin, along with the circumstances of the exhibitions, and continues:

> Eventually, after diligent inquiry and examination, he [Henri de Poitiers] discovered the fraud and how the said cloth had been cunningly painted, the truth being attested by the artist who had painted it, to wit, that it was a work of human skill and not miraculously wrought or bestowed.

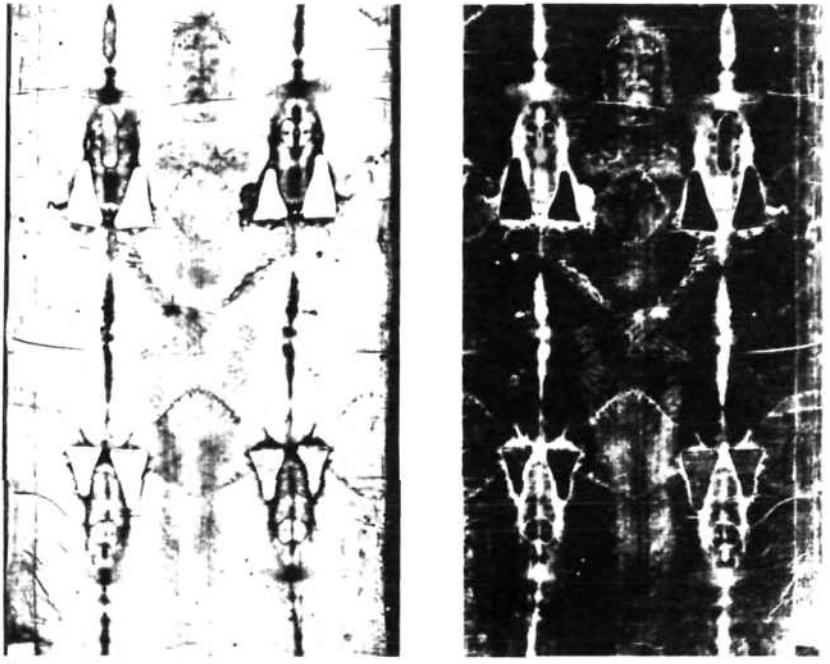

FIGURE 1. The half of the shroud containing the frontal image, normal photographic print on left, negative print on right.

Later in his letter Pierre states:

> I offer myself here as ready to supply all information sufficient to remove any doubt concerning the facts alleged.

Clement considered the matter and issued a Bull, which, although allowing exhibition of the cloth, ordered that it be advertised only as a "copy or representation." However, this directive was gradually forgotten, and the proclaimed shroud came to be the most venerated relic in Christendom. To the credit of the Church, while it did not discourage popular veneration, it never took an official stand on the question of authenticity. Within the hierarchy itself, the earlier skepticism has evolved into the guarded belief of the present day—after all, the infallibility of bishops has yet to be proclaimed.

The second important event in shroud history prior to 1898 was its near-destruction in a chapel fire in 1532. While its silver-lined reliquary casket was burning, it was doused with water. This resulted in burn holes (from drops of molten silver) and water stains that partially disfigure the body image. The patched burn holes now appear as rows of triangular spots on both sides of center. (See Figure 1.) The relic has reposed in Turin in this condition for four centuries.

Both ventral and dorsal images of an unclothed, apparently crucified man appear on the same side of a 14-foot-long piece of herringbone-twill linen cloth—as if the body had been laid onto one half of the cloth facing up and the cloth had then been folded over the head to cover the front part of the body. Needless to say, this is not one of the customary ways of wrapping a body; it is also contrary to the description given in the Gospels.

There are many other circumstantial arguments against authenticity, but these cannot be given here; the reader is referred to the writings of Joe Nickell [5]. One central problem is how fifty square feet of high-grade linen, uniquely bearing a life-size image sacred to Christendom, could have escaped explicit historical notice for thirteen centuries.

Post-1898 Investigations

Scientific interest in the Shroud of Turin dates from the first photograph of it, taken in 1898. To the unaided eye, the image on the shroud appears, at least in modern times, faint and nebulous. The image is straw-colored and only slightly darker than the old linen itself. It has the property of appearing to fade out as one approaches to examine parts of it more closely. Also, it has little visual impact, being rather tentative and unappealing.

But the first photograph changed all this. The negative (white-on-black) image showed a distinct figure with Gothic majesty of form and bearing—definitely more "Christ-like," in the canonical art sense. (Compare the negative and positive images displayed side-by-side in Figure 1.) The immediate and obvious question then presented itself: How could an artist, even an artistic genius, have been prescient enough to have contrived to create an image whose perfection would not be revealed until more than half a millennium later? Since no one could give a satisfactory answer, shroud scholars and clerics naturally postulated a miraculous origin for the image. And, as naturalistic explanations for the image—the contact-transfer and vaporgraph hypotheses, for example—were in time shown to be indefensible, skeptics, for the first time, found themselves in an uncomfortable position.

Growing Awareness of the Shroud Mystery

So it happened that different kinds of people, including a sprinkling of scientists and pathologists, began to take the problem posed by the shroud image seriously. Once clear, distinct photographs had become available, devout pathologists and surgeons like Barbet [6] had a field day showing how the image and "bloodflows" agreed in minute detail with the pathology of crucifixion. Their claim was that no artist, particularly in medieval times, could have known that much detail about the medical

aspects.

The result of this was a slow but steady increase in scholarly interest in the puzzle of the shroud in the early and middle decades of this century. Nearly all of the interest, however, was restricted to Roman Catholics. Ecumenical interest developed only relatively recently.

In 1969, and more seriously in 1973, small groups of Italian scientists were appointed to make limited tests and observations. (Before word of its existence was leaked, this official commission had been kept secret for several years.) The results were mixed: While they established that the image was not the result of ordinary painting, they also failed to get a positive test for blood in the "bloodstain" areas. Overall, the tone of the 1976 report [7] of this work was slightly skeptical. Two of the experts even suggested that the photographic negativity of the image might be due to some artistic printing technique using a model or molds.

3-D or not 3-D?

The next big "break" in the shroud conundrum came in 1976. John Jackson, joined shortly later by Eric Jumper (both then at the Air Force Weapons Laboratory in Albuquerque, New Mexico), discovered that the shroud image could be interpreted as containing unique three-dimensional information about the corpse they assumed it once was wrapped around. This meant that, allowed their implicit presupposition, they could produce a statue of the "Man in the Shroud," as they called it. This unexpected revelation had a profound impact on the Church hierarchy, as well as on the organizational meeting of STURP held in Albuquerque in March 1977 [1]. The crucial role of the necessary presuppositions was poorly understood. It was swept aside in the nearly unanimous enthusiasm about having made a discovery tantamount to proof that the shroud image could neither be the work of an artist nor caused by natural processes. This discovery doubtless played a decisive role in persuading the hierarchy to allow another, much more thorough round of scientific tests after the shroud was put on public display in Turin in September 1978. (Jackson and Jumper, the founders of STURP, were also able to exert influence through the Holy Shroud Guild, where they sit on the Executive Council.)

Combined with preliminary observations indicating that the image characteristics were similar to those of lightly and superficially scorched linen, the so-called 3-D effect resulted in the hypothesis that the image was caused by a "short burst of radiant energy," probably emanating from the body of Christ at the moment of resurrection [1], [2]. Judging from published statements, it appears that nearly all of the new members joining STURP at this time accepted this hypothesis as the only viable one in the light of the evidence then available. Predictably, the media eagerly picked up this hypothesis and, sans caveats, disseminated it here and abroad as a scientific result. As commonly happens in circumstances suggesting a

paranormal explanation, the old journalistic maxim that extraordinary claims demand extraordinary proof was conveniently forgotten.

Let's examine this most extraordinary hypothesis more carefully. More detail can be found in [1]; the radiation-scorch hypothesis has not been published in the scientific literature. The arguments given below were published on December 16, 1979, as part of my critical review in the *Los Alamos Monitor.*

First, an outline of the shroud image is carefully traced, full size, onto a piece of cloth simulating the actual "shroud." The cloth is then draped over the reclining figure of a suitable human male volunteer (5'11", 170 lbs.) so body parts on the simulated image are in contact with, or vertically over, those of the volunteer. Then by optical techniques (more difficult than they appear) the vertical cloth-to-body distances are determined for a two-dimensional array of image points. Previously, the optical density (darkness) of a photograph of the shroud image had been determined by microdensitometry for a two-dimensional array also. Thus image darkness can be correlated with cloth-to-body distance over a two-dimensional field. This correlation turns out to be only fair, exhibiting a lot of data scatter, but it does indicate a roughly exponential-type fall-off to near-zero image-darkness in a little less than two inches. Jackson and Jumper then draw a smooth curve (an exponential function in the early work) through the region of the scattered data points and call this the "mapping function."

But they also have to make allowance for the sag and drape of the cloth by determining, for the same two-dimensinal array, the distances of the cloth above the table top on which the human model reposes. (By simple subtraction, one also has the shape of the upper surface of the model relative to the table top.) This done, once they have the image darkness for a specific point on the shroud image, they can mathematically invert the mapping function to give the corresponding cloth-to-body distance. From this procedure along with the drape-shape function, the height above the reference plane of a point on the presumed human shape under the shroud can be calculated. By doing this for all the points in the two-dimensional array, they obtain a three-dimensional image reconstruction that can be either viewed isometrically on a computer-generated graph or used to manufacture a statue of the "Man in the Shroud." The resultant three-dimensinal figure looks rather human but is somewhat distorted. To make it look better, the mathematical drape-shape function is iteratively changed—after all, no one knows how the alleged actual shroud might have been draped in a tomb in Palestine two millennia ago. Indeed, the mapping function itself is also modified to give a less-distorted human figure. The final three-dimensional figure then looks normally human except for one thing: If the face is adjusted to have normal relief, the body appears to be in bas-relief.

The salient point is that the three-dimensional reconstruction method depends *essentially* on circular reasoning, and the question of whether or

not the shroud ever contained a human form is begged. Also, if there were no measurement errors in determining the cloth-to-body distances, and if there were no data scatter in the correlation plot of image darkness against distance, then they would wind up with just a three-dimensional relief of the human model chosen for the experiment! The irony is that the smoothing process (replacing a scatter plot with a smooth function) itself produces distortion of the relief, but it also affords the opportunity for some of the characteristics of the shroud image to be superimposed on the relief of the human model. Hence the resultant statue is some blend of the human model and the shroud image—not, as has repeatedly been asserted, a statue of the "Man in the Shroud."

What Jackson and Jumper have done is to demonstrate that they can obtain a fair correlation between the image darkness on the shroud and the corresponding cloth-to-body distance they obtain when a particular human model of the proper size is overlaid with a cloth draped in an optimized way. But, because correlation is not causality, that is all they have done. The fact that they have reconstructed a statue from the shroud image using the method above does *not* imply that the image was formed by projection across the distance from body to cloth—or by any other method, for that matter. Some degree of internal consistency in tonal gradations over *localized* regions of the shroud image is all that they have established, despite five years of brouhaha in the press.

By now, and much to their credit, many of the STURP scientists (including all of the Los Alamos branch) have changed their minds concerning the implications of the "3-D effect." They now largely agree with my views stated above. However, there is an influential faction led by John Jackson that still espouses either the radiation-scorch hypothesis or a close semantic relative, despite the compelling evidence that the image is not a *radiation* scorch. For one thing, scorches on linen, whether modern ones or relics of the 1532 fire, exhibit strong reddish fluorescence under ultraviolet irradiation, but the shroud image does not fluoresce at all [8]. For another, STURP, carrying out many trials with lasers of diverse wavelengths and pulse-widths, has not been able even to come close to duplicating the microscopic shroud-image characteristics by lightly scorching linen.

For this and the other reasons given above, the supernatural radiation-scorch hypothesis should have been laid to rest long before now; but it keeps reappearing in the media, in books [2], [9], and even in the *Harper's* article [4] in more restrained language. The recent book [9] by Stevenson and Habermas (reviewed by Schafersman in this issue of *SI*) reaches the conclusion that the shroud is the burial cloth of Christ largely through belief in the validity of the radiation-scorch mechanism of image formation. This despite (or, more likely, aided by) the fact that they fail to understand the first principles of the logic involved.

One by-product of the three-dimensional work was the "discovery" of

strange, nonspherically shaped eyeballs, which can be made to appear to be flat objects if the mapping function is altered to reduce the normal facial relief. Much has been made of the interpretation of these flattened regions as coins over the eyes—particularly by Father Francis Filas, S.J., of the Holy Shroud Guild. Filas claims to have dated the shroud to the middle of the first century by identifying the inscriptions on ancient Roman coins covering the eyes. Press notices on this subject, as well as a half-hour television show, have appeared periodically for several years despite the fact that the claim is so patently absurd that STURP has disclaimed it. The magnified weave patterns in the image areas function somewhat as a Rorschach test—one sees what one wants to see.

Could the Image Be a Rubbing?

The discovery in 1898 that a negative photograph of the shroud image was much more visually appealing than a positive (or the shroud image itself) became a turning point in the longstanding controversy. Thenceforth, shroud scholars held that, since it was long before the invention of photography, no medieval artist would have produced a negative image. Indeed, this, along with the impressive medical evidence, constituted the main argument against forgery before the "3-D effect" was discovered in 1976. However, this situation changed in 1978 when Joe Nickell demonstrated that a rubbing technique, used since the twelfth century or perhaps much earlier [10], automatically produces an image that simulates many of the characteristics of the shroud image, including photographic negativity [5]. If some care is taken in the procedures, the resultant image is rather faint, shows no brush marks, has visually proper tonal gradations, and has a depth of color penetration limited to a few surface fibrils. The technique is to wet-mold a cloth to a bas-relief sculpture, let it dry, and then rub on the pigment medium with daubers of varying size, depending on the contours. Nickell's early work was done with myrrh and aloes, but lately he has been using either dry hematite powder or hematite in a cake matrix.

Nickell's first rubbing was done using an available bas-relief—a four-inch oblique (nonfrontal) view of the face of Bing Crosby. STURP applied its mapping function to a half-tone magazine photograph of this image and found it wanting. As expected, it exhibits the three-dimensional information it picked up from the bas-relief, but STURP's three-dimensional reconstruction from it is badly distorted in places. Whether or not this is a proper and significant test is highly debatable, but nevertheless STURP has made much of this "failure" [4]. It has used this one early result to dismiss Nickell's rubbing technique as a method a forger could have used. There is some question whether this "3-D test" (actually a test for local consistency in tonal gradations) forms a proper crucial test of a method of image formation: the particular mapping function appropriate for the shroud image could be expected to depend on many accidental circum-

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FIGURE 2. Negative photograph of the face of the shroud image.

© 1981, Joe Nickell

FIGURE 3. Negative photograph of a rubbing image done by Joe Nickell using iron oxide as the pigment.

stances attendant at image formation.

It is clear that STURP's conclusion is unwarranted at this time. First, the number of variations of the rubbing technique are enormous—who could say that one of the many could not pass STURP's procrustean "3-D test"? Second, Nickell has by now improved his technique. He has a larger, frontal-aspect bas-relief that gives rubbings bearing a distinct, but not perfect, visual resemblance to the face of the shroud image—see the comparison in Figures 2 and 3 between a negative of the shroud image and one of Nickell's images. Who could say that a few more trials, with appropriate changes in succession, might not result in an image closely simulating the shroud image in appearance and in local consistency of tonal gradations?

A Pathological Case?

Several pathologists of obviously strong convictions have long claimed that the shroud image accurately depicts anatomical details along with the wounds described in the Gospels. More recently, a pathologist associated with STURP who is a member of the Executive Council of the Holy Shroud Guild has claimed that no artist could have known enough about the pathology of crucifixion to have forged the image. This pathologist, Robert Bucklin, claims (along with several others) that the medical details

of the "bloodflows" are too perfect to have been forged. Also, in the afterword to *Verdict on the Shroud* [9], Bucklin states that "there is support for the resurrection in the things we see on the Shroud of Turin."

All of these claims have recently been challenged [11] by an outside pathologist, Michael Baden, deputy chief medical examiner of New York for Queens County. Baden claims that nearly all of Bucklin's assertions concerning anatomical and pathological features of the shroud image and "bloodflows" are either dubious or incorrect, and on the basis of the image characteristics themselves it is very probable that the shroud never contained a corpse.

What Is the Image Composed Of?

So far we have considered only the macroscopic aspects of the shroud. Now we turn to the issues of microscopic and chemical constitution. Surely, one might hope, the central issue of authenticity versus forgery should be settled here if anywhere.

The details of the many microscopic and analytical tests performed by STURP cannot be given here—see [4] and [12]. In brief, STURP finds no foreign organic substance on the image fibrils. Its unanimous conclusion is that the straw-yellow color of the image fibrils was probably caused by dehydration of the cellulose. With respect to inorganics, STURP's x-ray fluorescence tests find an appreciable amount of calcium as well as detectable iron rather evenly distributed across image and clear area boundaries.

Blood on the Shroud?

In the "bloodstain" areas, STURP finds much more iron and appreciable protein, but no sodium or potassium. (All of these are present in actual blood.) Also found is intense Soret spectral absorption [13], indicating the presence of a porphyrinic material. Other tests also suggest that porphyrins are present. (The presence of porphyrins does not necessarily imply blood—many kinds of porphyrins are present in common plant and animal substances.) From these tests and other, less definitive ones, STURP concludes (apparently unanimously) that the shroud "blood" areas are indeed blood. It also states that there is nothing to suggest that anything other than blood is present in these "blood" areas.

My opinion is that, while real blood could well be present, STURP has not established that it is. More important, it has no case at all for asserting that the "bloodstains" are entirely blood. As an illustration, the reflectance spectrum of Fe_2O_3 on linen [8] fairly closely parallels that of the shroud "bloodstains." From these curves, I roughly estimate that as much as 50 percent of the bloodstain color could be due to Fe_2O_3. Some such adulteration is strongly suggested by the fact that the "bloodstain" areas

appear much too red to be just blood—old blood is always brown or black. STURP cannot refute the contention that an appreciable fraction of the "bloodstains" could be due to an artist's pigment composed of iron oxide. Further support for this contention comes from the picturelike appearance of the "bloodstains"; this would seem impossible if blood on a corpse dried in contact with the linen and this was later pulled free.

Of course the putative artist would be likely to use some real blood in producing the "bloodstains" anyway, and so the presence of blood is not of great importance in deciding authenticity. What is of crucial importance is whether the "bloodstains" are at least partly composed of some pigment foreign to blood. There is strong evidence for this, as we shall see.

How Was the Image Formed?

There are only three classes of possibilities for the image formation: by human artifice, through natural processes transferring the image to the linen from a real crucified corpse, or by supernatural means. Of the third, not much can be said, because then all scientific discussion and all rational discourse must perforce cease.

But a lot can be said about natural processes. In terse summary, they can be ruled out *definitively* by the quality and beauty of the shroud image. However, since natural processes involving contact transfer and vapor transport have long been discussed as possible mechanisms, we should really lay them to rest here. In this, STURP would concur wholeheartedly.

Both contact-transfer and vapor-transport mechanisms are ruled out by the observed superficiality and lack of saturation at supposed points of contact with the corpse. Also, the image-forming process must be pressure-independent, for the maximum image darkness is the same for the dorsal image (supposedly with a body lying on it) as for the ventral. Contact transfer cannot explain image formation in the many places (like eye sockets) where the linen would not be expected to touch, and tonal gradations would be quite limited in any case. And then there is an inescapable fact of geometry: Even if the cloth were to be somehow closely molded to a full-relief (body or statue) for contact transfer to take place, then when it was taken off and flattened out the image would be grossly distorted. The fatal flaw of vapor transport is the undeniable fact that gross blurring necessarily results from a diffusive process acting across a distance.

Artistic processes are quite another matter, however. While some can be ruled out, others cannot be—quite contrary to all STURP press releases, the recent *Harper's* article [4], and all books on the subject. That the shroud image was not painted in any ordinary sense of the term is by now beyond dispute. But what about "cunningly painted"? Scorching from a full-relief, whether by contact or by radiation transport, can be ruled out for many reasons, including those given in the paragraph above. Very light

scorching from a moderately hot bas-relief cannot be ruled out with certainty, but it runs into serious trouble with image superficiality as well as scorch fluorescence. In its favor is the fact that low-temperature scorches do result in dehydrated cellulose.

But there are also other methods of dehydrating cellulose, and these can be employed in a hypothetical hypothesis of human artifice, as we shall see, which STURP cannot refute at this time. Yellowing of linen due to cellulose dehydration can be caused by a large variety of common substances [8], perhaps nearly anything, in contact with linen. With the passage of time, exposure to sunlight, or elevated temperatures such as those due to gentle baking, substances from body oils to lemon juice are observed [8] to produce accelerated dehydration of cellulose fibrils. In order to obtain an image due solely to dehydrated cellulose, the medium would have to be applied very sparingly so that it would either be consumed in the reaction or would disappear (over time or temperature) by evaporation or sublimation. To limit the image coloration to superficial depths, the medium would have to be applied in the form of a dry powder or a semi-solid cake. Also, the possibility that the shroud was washed at some time after the image became fixed cannot be ruled out and is another possible mode of medium disappearance.

The only technique of medium application that appears probable at this time is the rubbing technique of Joe Nickell, discussed earlier. On October 2, 1980, I sent a Los Alamos STURP member a brief note proposing a simple rubbing scenario. STURP has not yet refuted it. All that would be necessary, at least in principle, to form the shroud image is to postulate that the rubbing was done using a semi-solid, presumably colored (so the artist could see what he was doing) medium that, over the six centuries or in the 1532 fire, has virtually disappeared, leaving behind only cellulose fibrils discolored by dehydration.

Until they have ruled out this and similar hypotheses, STURP members have no justification whatsoever for stating, as has been reported in the media for years, that their conclusion is that none of the forgery hypotheses is tenable. Lately, they've been calling the mechanism of image formation "a mystery." This is somewhat misleading; it implies that there is no viable hypothesis at this time. The one given above is not yet established experimentally, but it does deserve to be taken seriously. In private, several of the Los Alamos members will admit that they have not really ruled out human artifice. Nationwide, at least, most members still seem to regard the dehydrated-cellulose image as a probable low-temperature scorch, and the image as having been somehow "projected" across space onto the cloth. This is, of course, the old radiation-scorch hypothesis in thin semantic disguise. The main difference between 1977 and the present is that much more is known now, and STURP members are more puzzled and much less certain. Also, and this cannot be overemphasized, STURP nowadays is hardly monolithic—it is really an assembly of individuals holding rather

diverse opinions.

However, ex-STURP members Stevenson and Habermas in their recent book [9] regard the radiation-scorch hypothesis as proved and as God's belated gift to believers. They fully realize that it clearly implies supernatural intervention. Their book is replete with one or more significant misunderstandings and misrepresentations—both subtle and gross—on almost every page. STURP as a whole is quite unhappy with the representation of the book as a publication of STURP results.

Enter Walter McCrone

I have purposely saved a discussion of Walter McCrone's contributions until last. Since STURP unanimously rejects McCrone's interpretations and conclusions, I wanted to demonstrate first that even without McCrone's results one can make a good case for human artifice.

But who is Walter McCrone? He is certainly the best-known forensic microanalyst in the world and is widely regarded also to be the best in his field. He runs the McCrone Research Institute in Chicago, which performs microscopic and ultramicroscopic tests of all kinds using a panoply of sophisticated instruments in addition to optical microscopes. He is best known for having produced the definitive work [14], in five volumes, on microscopic particle identification and assay techniques, as well as for showing in 1974 that the formerly celebrated "priceless" Vinland Map of Yale University (supposedly a pre-Columbian map of the American east coast) is actually a modern forgery on ancient parchment.

During the 1978 tests on the shroud, STURP used an especially pure sticky tape to lift samples from the shroud surface for later analysis. Thirty-three tape samples were obtained at carefully measured locations in different regions on the shroud. STURP gave McCrone, who was still a member at the time, thirty-two of the tape samples for analysis. A "blind" study [15] was conducted to separate the tapes by microscopic observations into two groups: those with apparent pigment particles on the fibrils, and those without. None of the ten samples from clear (no image, water stain, or "bloodstain") areas showed pigment particles; nineteen from image and "bloodstain" areas showed significant amounts of pigment. Of the nine tapes from image areas, three did not exhibit significant pigment, but these were from areas with a very weak image. McCrone subsequently identified the particles as micron-size hydrous and anhydrous iron oxide. These particles are mostly well dispersed and coat the individual fibrils in both the image and the "bloodstain" areas, with the latter having a much greater particle density. Also found, in the "bloodstain" areas predominantly, are large numbers of red clumps or aggregates of about 10- to 25-micron size; these contribute appreciably to the reddish color of the "bloodstains."

Since he finds practically no iron oxide in the clear areas, and since

artists' pigments containing iron oxide (red ochre or hematite) were widely used in the Middle Ages as well as much earlier, McCrone suggests that iron earth pigment was intentionally applied by hand to form the image. STURP admits that there are some iron oxide particles on the image fibrils but claims they are of insufficient number (actually, areal density) to contribute appreciably to the visual image coloration. STURP backs this up with optical reflectance spectra [8] of the shroud image areas and claims that the spectrum of Fe_2O_3 is much too red for iron oxide to be a significant factor in the overall image color. McCrone counters that the color of iron oxide particles varies from yellow to red depending on the state of hydration and that most of the particles on the image fibrils are yellow. After reviewing the evidence on both sides, I *tentatively* conclude that ferric oxide contributes less than about 10 percent to the overall image intensity; but more experiments should be done.

My thinking is that, while the issue of visibility is important, it falls short of being crucial. What *is* crucial is whether McCrone is right in claiming that iron oxide particles are found only in the image and "bloodstain" areas and almost never in the clear areas. Because no conceivable natural process of iron oxide particle formation could so discriminate between image and clear areas, a reliable finding of iron oxide—*even in macroscopically invisible quantities*—only in the nonclear areas would be tantamount to proof that human artifice was involved in producing the image. One possible scenario would be that the image was formed originally by iron oxide pigment dispersed in some semi-solid matrix in sufficient concentration to produce deeper image coloration than now exists. Subsequently, over six centuries of exhibitions and handling (very much more frequent in the early centuries than the later) the larger particles were sloughed off, leaving a faint image colored mainly by dehydrated cellulose fibrils coated sparingly by micron-size iron oxide particles. (Micron-size particles are known to adhere *tenaciously* to any fabric.)

The red particle aggregates I mentioned are quite numerous in the "bloodstain" areas, where they contribute to the redness of the visual image. At about 30-power magnification in STURP photographs [3], they appear as numerous red specks among the threads. McCrone analyzed [15] eleven of these red specks using scanning electron microscopy, electron microprobe analysis, electron diffractometry, x-ray diffractometry, and energy-dispersive x-ray analysis, as well as optical microanalysis. He finds the specks to be agglomerates of particles containing mainly calcium and iron with frequent large quantities of mercury.

Maps of the iron distribution within the individual agglomerates usually correlate well with the observed distribution of red color, but in some cases the brightest color correlates best with separate-but-identical distribution maps of mercury and sulfur. The presence of significant amounts of HgS, a pigment called vermilion, has been demonstrated

unequivocally in six of the eleven agglomerates. One agglomerate even contained enough mercury to form a tiny "mirror" when reduced onto a microscopic copper sliver in a well-known test for mercury.

Vermilion is also an artist's red pigment used widely in the Middle Ages and earlier. Because vermilion cannot come from blood or any other body substance, its presence in a "bloodstain" area strongly indicates that the "bloodstains" have been produced, at least in part, by an artist. A crucial issue here is how representative of the speck population is McCrone's sample of eleven? More work needs to be done on this.

Epilogue

So modern experimental science in its full-bore, megabuck aspect has now been used to confront the most venerated relic in Christendom, and the outcome is still far more tentative and debatable than most observers expected. That the Shroud of Turin is not a painting in the *standard* sense has been demonstrated unequivocally; that it was not produced by unaided natural processes is virtually certain. All that now remains is to decide between human involvement in "cunningly painting" it and its provenance through means totally unknown and unimaginable to science—and therefore possibly supernatural. Needless to say, the issue at stake here is one of epochal potential implication.

Because modern science has never had to introduce a supernatural hypothesis (whatever that might mean, since scientific method is absolutely and essentially based on naturalistic explanations) *scientific* investigators eschew any paranormal or supernatural explanation—even for something that has long been venerated as the actual image of Jesus Christ. In their *recent* public statements, STURP members do avoid *directly* mentioning a supernatural explanation. However, in newspapers, and particularly in books, as well as in the recent *Harper's* article, the supernatural is often directly suggested, or is, at least, logically implied by ruling out human involvement.

But what is a skeptical inquirer to make of all this? He will naturally try to formulate a human-artifice hypothesis consistent with the known principles of art and science and also consistent with the observations of STURP, McCrone, and Nickell. Such a hypothesis has been discussed in the previous section, but in a rather disjointed manner. To recapitulate briefly here: First, the image-forming method will probably have to be based on some kind of imprinting technique to impart photonegativity automatically—most likely rubbing, à la Nickell. Second, the rubbing medium must be dry or semi-solid (to limit image depth), must contain a coloring pigment (probably an iron earth), and must largely disappear (being nonproteinaceous would help, relative to STURP's tests) by reaction with cellulose over time and temperature, or perhaps by evaporation, leaving finally only dehydrated cellulose fibrils coated sparsely with iron

oxide particles.

It appears certain that STURP cannot rule out this hypothesis, or similar ones, at this time. Why then do recent press releases and publications (such as the *Harper's* article, which obviously enjoyed STURP's blessing) state that human artifice has been eliminated as a possible image-forming method? First is the fact that the media do frequently distort statements to serve their needs. Media writers are insatiably hungry for important and unusual stories—particularly those with the air of a "breakthrough," as well as those involving religion or the paranormal. Just a whiff of a hint that the shroud could be authentic is sufficient to fulfill these conditions. Second is the obvious fact that STURP itself is far from blameless in this matter. Scientists, like all human beings, desire to make a difference in the world by working on something of considerable (if not epochal) importance. Concluding that the shroud is the work of an artist would dash the hope of changing the prevalent scientific world-view. Also, the strong religious inclinations of nearly all of the STURP membership doubtless play a role here.)

With its radiation-scorch hypothesis of 1977, STURP released a potent and willful genie that now refuses to get back into the bottle on command. Some STURP members admit in private that they regret the matter was handled the way it was. With the benefit of hindsight, what was their main mistake? It was, in part at least, neglecting to include card-carrying "skepticians" in their working group. Thoroughgoing, scientific skeptics would certainly have been a great help in keeping *that* genie bottled up. Of course it is easy to criticize now. In reality, very few skeptical scientists would have been willing, even if invited, to sacrifice years of family and vacation time for the dubious reward of (in their opinion) finally finding the obvious—an obvious devoid of much real scientific interest. Hence a kind of selection process among the STURP investigators was inevitable, for this and other reasons.

What then of the future? Foremost is the need to date the shroud cloth by radiocarbon methods. This could now be done with independent replications using a total amount of cloth no larger than a fingernail, and with an accuracy of about ±100 years. Any replicated date more recent than about A.D. 300 would establish that it is not the burial cloth of Christ. However, since an artist might well have bothered to obtain ancient linen, a date of even A.D. 30 ±100 could not rule out forgery. Hence, the church hierarchy has little incentive, and considerable disincentive (unless its faith in the shroud is very strong), to permit radiocarbon dating. To the credit of STURP, it has made several concerted attempts to persuade Turin and the Vatican to permit radiocarbon dating; one of these was turned down by the Vatican nearly two years ago, and a new attempt is being made now. STURP points out that there is enough charred shroud linen hanging loose under the burn patches for several hundred dating tests, so the church's argument against destroying shroud cloth is weak indeed. Ideally, of

course, the shroud investigation should have *started* with radiocarbon dating, which might then have saved an enormous number of man-years—both within and without STURP.

Another point that really needs to be settled is the serious disagreement between McCrone and STURP over what is or is not on the cloth. Replication, the tedious and costly price that science pays for objectivity, is probably the key to resolving this controversy. In the many areas of disagreement, the procedures of McCrone and STURP should be repeated (adding random sampling and extension to larger shroud areas) at a suitable independent laboratory, ideally under the close scrutiny of both McCrone and a STURP representative. It would indeed be surprising if this didn't settle the controversy once and for all.

Finally, the hypothesis I have presented, that the dehydrated-cellulose image was formed by use of a rubbing method, should be subjected to serious and careful testing. Iterative trials should be made to try to simulate the shroud image both macroscopically and microscopically. What is required is a bona fide commitment to trying to show how an artist might have forged it.

This could involve rubbing using a bas-relief (perhaps to start with, the one used by Joe Nickell in producing Figure 3) and a medium similar to the one I have discussed. Aging and the 1532 fire would be simulated by low-temperature oven-baking [8]. After-baking treatment might include washing to try to remove the last trace of rubbing medium from the cloth. The handling and folding/unfolding of the early centuries could perhaps be roughly simulated to determine the degree of iron oxide sloughing and transfer.

This is a serious challenge. STURP, having the resources and expertise required, should be eager to accept it.

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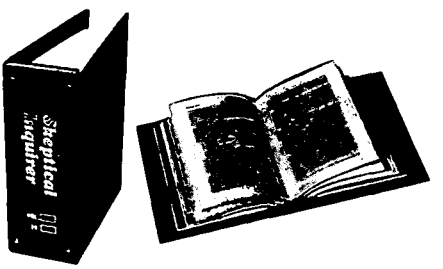

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Shroud Image Is the Work of an Artist

Walter McCrone

I am very pleased to have this opportunity to summarize my present position with respect to the Turin shroud. My position has not really changed during the past year or so since I completed the experimental work, although I have become more confident and have expressed my conclusions with a little more care and precision.

My microanalytical work on the sticky tapes from the shroud's surface has proved to my satisfaction that the entire image was produced by an artist using iron earth and vermilion pigments in a tempera medium during the middle of the fourteenth century. All of the image area tapes show varying amounts of two red pigments, which are easily identifiable as either an iron earth pigment or vermilion. The amount of these pigments is greater in the areas of greater image density, particularly the "bloodstains." Smaller amounts are present in image areas, and in some image areas only very small amounts of the pigment can be found. The dispersion of very tiny pigment particles characteristic of the image areas is totally absent in control samples from the cloth.

The image was created by an artist who was commissioned to paint a shroud, probably to be used in religious processions or to be exhibited in the newly founded church in Lirey by the de Charny family. I doubt if the artist was intending to fool anyone, and I feel that the church vergers didn't have to make any conscious effort to convince the general populace that this was the shroud of Christ. I think the vergers did allow the populace to come to that conclusion and, since that time, of course, most believers have so concluded.

Coming back to the image itself, I feel that the artist, having been commissioned to paint a shroud, did an inspired job of thinking just how one might expect an image to appear in the absence of light, hence no

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shadows. He had to depend on thinking of a cloth simply in contact with the human body. He naturally filled in the portions where the cloth touched the high points of the body and then artistically graded them in decreasing intensity from those high spots, thus creating a pleasing image and one which, it then turns out, automatically produces a photographic negative when copied photographically and indeed develops a three-dimensional structure when interpreted in terms of cloth-body distances as Jackson and Jumper did. There is nothing unusual about this and it was in fact entirely automatic. The artist, of course, certainly knew nothing about photographic negatives, nor did he think about three-dimensional reconstructions.

Finally, I can see no possible mechanism by which the shroud image could have been produced except as the work of an artist. The faithful representation of all of the anatomical and pathological markings, so well described in the New Testament, would be difficult to produce except by an artist. They are totally without distortion and, indeed, look exactly the way we would like to have them look. ●

Science, the Public, and the Shroud of Turin

Steven D. Schafersman

The Shroud of Turin. By Ian Wilson. Image Books/Doubleday, New York, 1979, 320 pp., $3.95.

"Shreds of Evidence." By Cullen Murphy. *Harper's*, November 1981. pp. 42-65.

Verdict on the Shroud. By Kenneth E. Stevenson and Gary R. Habermas. Servant Books, Ann Arbor, Mich., 1981, 224 pp., $12.95.

Readers of the SKEPTICAL INQUIRER are no doubt unhappily aware that the media rarely present a critical or opposing viewpoint when confronting their audience with claims of the paranormal and the supernatural. The public's seemingly insatiable appetite for the miraculous and the supernormal, the naturally unexplainable phenomenon, and the marvel of modern science's hopeless confusion and impotence before wonders of ancient origin has been amply fulfilled in recent years by such authors as von Däniken and Velikovsky.

The latest example in this deplorable series of media events is the "Shroud of Turin," the supposed linen burial-shroud of Jesus Christ. All the necessary elements of awe, mystery, and melodrama are present: the existence of an actual physical object, a long history of religious veneration and immense religious implications, painstaking scientific examination by a team of forty scientists (the Shroud of Turin Research Project, or STURP) using the latest space-age gadgetry, and, of course, the "unexpected" outcome—startling scientific revelations that the investigators cannot explain by natural processes. The Shroud of Turin example surpasses UFOs, the Bermuda Triangle, and ancient astronauts in a number of interesting ways. First, the shroud really does exist; it was displayed to millions of pilgrims in 1978. Second, we were recently treated to the unprecedented spectacle

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of a team of serious United States scientists who traveled to Italy to deliberately examine this notorious religious relic. Third, many of their findings were published in legitimate scientific journals. Fourth, and very important, a large number of popular and professional scientific magazines, in addition to newspapers, presented lengthy and detailed descriptions of the scientific team's results with an appalling lack of skepticism. Finally, the inevitable publications appeared that presumed to make sense out of this nonsense by implicitly and explicitly invoking supernatural intervention. I review three of these publications in this essay, but I cannot ignore the scientific work that accompanies the Shroud of Turin story, since it is this very "scientific evidence" that the authors of the three publications call upon to demonstrate the "truth" of their implicit and explicit suggestions of authenticity.

History

The Shroud of Turin is an ancient piece of linen measuring approximately 4.4 × 1.1 meters. The cloth has on it the faint front and back images of a man who was apparently dead. Because the man on the shroud bears precisely the exact markings of a scourging and crucifixion, many believe it to be the actual burial cloth of Jesus of Nazareth. It is thus a religious relic and an object of faith and veneration for millions of persons. It was first exhibited in about 1357 in Lirey, France, but was immediately denounced as a hoax by Bishop Henri de Poitiers. We know this because of a letter written in 1389 to the Avignon Pope Clement VII by Pierre d'Arcis, Bishop of Troyes, in northern France. D'Arcis claimed that when the shroud was first exhibited by Jeanne de Vergy, the widow of Geoffrey de Charny, who was killed in the Battle of Poitiers in 1356,

> many theologians and other wise persons [were skeptical] that this could be the real shroud of our Lord, having the Saviour's likeness thus imprinted upon it, since the holy Gospel made no mention of any such imprint, while, if it had been true, it was quite unlikely that the holy Evangelists would have omitted to record it, or that the fact should have remained hidden until the present time. Eventually, after diligent inquiry and examination, he [Bishop Henri de Poitiers] discovered the fraud and how the said cloth had been cunningly painted, the truth being attested by the artist who had painted it, to wit, that it was a work of human skill and not miraculously wrought or bestowed. [Quoted in Wilson, 1979, p. 267.]

The fourteenth century was renowned for its abundance of religious relics, as Ian Wilson's book *The Shroud of Turin* makes clear. The purpose of relics was to attract pilgrims who would pay for the privilege of observing and venerating some object associated with their Lord and Savior. Wilson, in fact, presents the history of the shroud in remarkable detail, and this book must be read in its entirety to really appreciate the subsequent profusion of articles. One of Wilson's major goals in his book is to provide a speculative, some might say fanciful, history of the shroud before 1357, its first documented appearance. Wilson believes that the shroud was in fact venerated for centuries as the Mandylion of Edessa, the cloth bearing the face of Jesus that was allegedly "not made by the hands of man." This cloth was discovered in A.D. 525, hidden in a part of the old city gate of Edessa, a city in Turkey now named Urfa. It was taken to Constantinople in 944, where it joined, in a magnificent shrine described by Wilson as "a veritable Byzantine Fort Knox," the following items:

> ... two pieces of the True Cross as large as the leg of a man ..., the iron of the lance with which Our Lord had his side pierced, two of the nails which were driven through his hands and his feet, the tunic which he wore and which was taken from him when they led him to the Mount of Calvary, and ... the blessed crown with which he was crowned, which was made of reeds with thorns as sharp as the points of daggers. [De Clari, 1936, quoted by Wilson, 1979, p. 156.]

Try to refrain from smiling in smug self-satisfaction at the superstitious credulity of the Byzantines, at least until you have finished this review, at which time you may not feel like smiling at all.

"They don't come right out and admit that they are invoking the supernatural, but that's what Pellicori and Evans are doing."

Wilson's hypothesis is that the Mandylion was simply the Shroud of Turin folded in such a way that only the face was visible. This is so highly unlikely that few of the subsequent investigators and writers, including the STURP scientists, have taken this hypothesis seriously. However, one of the notoriously biased pro-authenticity authors (Johnson 1979) subtly presented Wilson's hypothesis as historical fact in a legitimate scientific journal, and Stevenson and Habermas (1981) endorse it. But Cullen Murphy, in his pro-STURP article in *Harper's* (p. 57), labels Wilson's hypothesis "a trail of circumstantial evidence," and he makes clear (p. 47) that "STURP, however, scorns circumstantial evidence." We will remember STURP's scorn of circumstantial evidence later, but for now another bit of circumstantial evidence must be examined closely.

Max Frei is the Swiss criminologist who in 1973 was permitted to press sticky tape to the shroud to remove dust and other particles for laboratory analysis. Having been trained in botany, Frei noticed that a substantial number of pollen grains from the shroud had been collected by the tape. Some of this pollen was from European plants, consistent with the shroud's exposure in France. Frei also identified the pollen of halophyte desert plants that are common to the Palestine area around the Dead Sea. This suggested to many that the shroud had indeed been in Jerusalem early in its history; but, as most of the authors we are examining here point out, this circumstantial evidence is not reliable because winds can transport pollen for great distances (Murphy 1981, p. 57; Weaver 1980, p. 747; Burden 1981, p. 79). However, the situation is much more complex than this. As described in great detail in Wilson (1979, pp. 77-81, 293-98), Frei actually claims to have discovered pollen on the shroud from four (and only four) distinct areas: (1) Europe (i.e., France and Italy), (2) Palestine (i.e., Jerusalem), (3) the Anatolian steppes (a region including Urfa), and (4) the "environs of Istanbul." We must remember that Wilson's hypothetical early history of the Shroud of Turin includes a beginning in Jerusalem (obviously!); an unknown journey to Edessa (Urfa, Turkey), where the Mandylion is first discovered; a journey to Constantinople

(Istanbul) to join the other Byzantine relics; and then the hypothetical journey to Lirey, France, by Crusaders and Knights Templar. Wilson (1977, p. 81) concludes that the "significance of [Frei's list of four distinct pollen provenances] is very substantial, and it is ironic that Max Frei should have been able to deduce so much from material literally as humble as dust." Ironic indeed! Frei published his list of plant species identifications at the International Congress of the Turin Shroud in 1978, at which time "he publically affirmed his support for [Wilson's] theory that the Shroud is one and the same as the former Mandylion of Edessa/Urfa" (Wilson 1979, p. 293). Both Johnson (1979, p. 78) and Stevenson and Habermas (1981, p. 26) conclude that Frei's work makes "inescapable the conclusion" and "strongly indicates" that the shroud has been in Palestine and Turkey. As a professional micropaleontologist, and being somewhat familiar with palynology (the study of spores and pollen), I find Max Frei's conclusions incredible. A professional palynologist should examine Frei's original tape samples containing his pollen grains, examine all of STURP's sticky tape samples for pollen, and request that duplicate and independent sticky tape samples of pollen and dust be allowed by the Turin authorities. Most STURP scientists doubt Frei's work and discount his results.

Skepticism and the Shroud

The article "Shreds of Evidence" by Cullen Murphy (1981) is respectful of the intentions and integrity of the members of the Shroud of Turin Research Project. The article portrays the scientists as real people, which is certainly legitimate, since scientists are people and science is a human enterprise. Murphy is careful to emphasize that STURP members "tend to divide their personas into 'scientist' and 'layman' as a prelude to giving two different answers." This clarification is, as we shall see, one of the keys to the whole shroud controversy. In Murphy's article, each STURP member expresses initial skepticism regarding authenticity of the shroud. Furthermore, they all claim that science can never prove the shroud's authenticity. "The facts, as team members never tire of repeating, will just have to speak for themselves" (Murphy 1981, p. 47). This statement is the other key. By empathizing so completely with the STURP scientists, and by having a writer's skill to express the significant opinions and attitudes that so frequently go unspoken, Murphy has performed a great service.

The STURP scientists have publicly adopted the mantle of arch-positivists, who contend that all knowledge regarding matters of fact is based only upon the "positive" data of experience, i.e., empirical data. One STURP scientist told me, in all sincerity, that only "producing observations and numbers is important." Arch-positivists believe that, when sufficient empirical data is lacking to verify a specific hypothesis, one must refrain from drawing conclusions. For example, Pellicori (1980) appealed to "the reader's sense of scientific trial, where judgment is reserved until all the facts are collected." But at what point are "all the facts" collected? STURP says they will never have sufficient evidence to prove or verify the authenticity of the Shroud of Turin. This sounds like good, hard-headed science. But it isn't, because this conclusion leaves unspoken two positivistic corollaries that STURP ignores: STURP will also never have sufficient evidence to prove or verify that the shroud is a *forgery;* and, since matters of fact are based only on objective,

empirical evidence, STURP members implicitly believe their personal or subjective beliefs do not and will not affect their scientific data or conclusions. Not only is such assumed positivism philosophically untenable; it is poor science. STURP's adoption of these views, including the implicit corollaries, contributes to individual members' frustrations, inadequacies, or ludicrousies, as the case may be.

Facts never speak for themselves; they can be understood only within a theory or hypothesis. It is impossible to prove or verify something in science. Subjective beliefs *do* affect results and interpretations. These are only three of the modern understandings of science of which STURP members are seemingly ignorant. In real science hypotheses fight for acceptance. They are tested and either refuted or corroborated.

What are the two hypotheses in the present case? The shroud is authentic or it is a forgery. Is there a possible third hypothesis? No, and here's why. Both Wilson (1979, pp. 51-53) and Stevenson and Habermas (1981, pp. 121-29) go to great lengths to demonstrate that the man imaged on the shroud must be Jesus Christ and not someone else. After all, the man on *this* shroud was flogged, crucified, wore a crown of thorns, did not have his legs broken, was nailed to the cross, had his side pierced, and so on. Stevenson and Habermas (p. 128) even calculate the odds as 1 in 83 million that the man on the shroud is not Jesus Christ (and they consider this a very conservative estimate). I agree with them on all of this. If the shroud is authentic, the image is that of Jesus. Otherwise, it's an artist's representation, i.e., a fraud. Note that we are not yet discussing miracles; the image could still have been naturally formed.

The Image on the Shroud

The image of the man on the shroud is unusual to say the least. It is a very faint, sepia-colored image that can barely be distinguished from the linen cloth. It can only be seen from a distance. As Joan Janney says, "The closer you get, the less you see. How could you paint it in such a way that while you're painting it you can't see it?" (Murphy 1981, p. 56) Most photographs of it are filtered to increase the contrast. The body image is a negative; the skin and hair, body parts of two different compositions and textures, produce an identical image quality. On the other hand, the "blood" is positive. Unfortunately, it doesn't look like old, dried blood; it is "exceptionally reddish" (Pellicori and Evans 1981, p. 41) or "a deep burgundy" (Murphy 1981, p. 44). Photographs of the image show the entire body, front and back, with *no distortion:* no folds, creases, spaces, or bends, things one would expect if a piece of cloth was draped over and under a supine body that transferred its image to the cloth (for example, if the body was covered by paint that then transferred to the cloth). In fact, the perfection of the image rules out, to my mind, the possibility of its being formed by *any conceivable* natural process, assuming, of course, that the shroud is authentic. It is this fact that has so greatly troubled STURP. They at first proposed various radiation hypotheses to explain the image, but these have now been retracted upon the realization that they were proposing supernormal or supernatural phenomena. As Murphy's article makes clear, STURP "cannot, for the life of them, say how it was made" (Murphy 1981, p. 47). This, of course, is pure positivism in action: since the evidence is lacking, we cannot come to a conclusion. The question is: Is the evidence lacking?

Murphy's article (p. 47) contains another interesting statement: "It is STURP's

conclusion that none of the forgery theories is tenable. Neither are any of the 'natural phenomenon' hypotheses." Obviously, this leaves only a supernatural authentic hypothesis. Now we're getting somewhere. Although STURP scientists don't want to explicitly endorse an obviously supernatural mechanism of image formation, they nevertheless *suggest* such a process by eliminating both a natural explanation and a forgery. Pellicori and Evans (1981, p. 43) say that "the Shroud is not the product of a clever Mediaeval artist.... To us, the idea that the image was transferred directly onto the cloth by skin contact remains the most plausible theory." They don't come right out and admit that they are invoking the supernatural, but that's what Pellicori and Evans are doing: the perfection of the image must mean that, somehow, all the wrinkles and distortions of the image transferred to the cloth were miraculously removed. They hypothesize that skin secretions or burial ointments caused the structural degeneration of the linen fibrels as a result of "natural, chemically induced molecular changes in the material." These later evaporated over the centuries. Ths is fine, but still there is no distortion. Nothing authentic *and* natural caused this, and Pellicori and Evans ignore this fact. The others in STURP do not ignore this fact and disagree with Pellicori and Evans.

Weaver (1980, p. 751) quotes STURP-member Ray Rogers: "Nearly all of us now believe that the shroud is not a painting." STURP-member John Jackson says that "when you add up everything we know, the argument against a forgery acquires a certain force" (Murphy 1981, p. 61). STURP member Pellicori (1980) says flatly: "We do rule out a man-made origin for the body image on the basis of our microscopic visual observational, x-ray fluorescence, and contour-decoding image processing results." STURP-member Joan Janney (1981): "We can conclude that the shroud image is that of a real human form, of a scourged, crucified man. It is not the product of an artist." If we accept the idea that either the shroud is authentic or it was created by an artist, STURP scientists are saying, since the shroud is not the product of human hands it is, in effect, authentic. This is the message of Cullen Murphy's entire article. By frequent subtle suggestion, by planting doubts about possible human artifice, by ignoring conflicting evidence (as we shall see later), and by claiming outright that "forgery theories are untenable," Murphy is concluding that the shroud is authentic. If it is authentic, and since no one can think of a natural explanation for it (Murphy even claims STURP holds all natural explanations untenable), Murphy and STURP are concluding it was formed supernaturally. I find this message, from legitimate scientists, to be appalling.

The STURP Scientists

It is difficult to come to grips with the paradoxes presented by the Shroud of Turin, especially the paradoxes in the minds of the STURP scientists. In print, they have all clearly stated that they have eliminated the artist, or forgery, hypothesis. Also, they clearly state that they either do not have a natural explanation or have only flawed natural explanations. For example, Pellicori's natural explanation of direct shroud contact to a human body is not accepted by the other STURP scientists because the image that would be formed could not show the perfect detail found on the shroud. Also, in the minds of some, this contact mechanism would not produce the "three-dimensional" information found on the shroud (more on this later). The vapor and radiation hypotheses are not acceptable, since vapor diffuses (i.e., it does

not travel in a straight line and so could not produce a distinct image) and no known source of body radiation could have produced an image on a flat shroud (thus imparting the "3-D" information of cloth-to-body distance that some STURP scientists claim is found on the shroud). The point is that there are really only two possibilities for the origin of the shroud: either it was made by an artist or it is a miraculous reproduction of the image of Jesus Christ. To contemplate a third possibility for *this* shroud (e.g., a natural image transfer of a crucified man who was not Jesus of Nazareth) is absurd. Therefore, by concluding that the shroud is not the work of an artist, the STURP members are concluding that it is authentic (i.e., Jesus and supernatural). At the same time, they constantly claim that science can never reach this conclusion. Of course science can't, but scientists can suggest it, as Cullen Murphy's article reveals so clearly.

"By frequent subtle suggestion, planting doubts about possible human artifice, ignoring conflicting evidence, and claiming outright that 'forgery theories are untenable,' Murphy is concluding that the shroud is authentic."

What is the source of the curious duplicity among STURP scientists by which they have "two different answers" to the shroud problem: on the one hand, their initial claim of skepticism and current claim of scientific inability to prove that the shroud is authentic and, on the other hand, their pervasive explicit repudiation of fraud and implicit suggestion of authenticity. I have already answered the first question by the clues in Cullen Murphy's article: the STURP scientists' adopted anachronistic stance of arch-positivism keeps them *both* from claiming verification of authenticity *and* from believing that their subjective prejudices or biases in any way interfere with their scientific work. As another witness to this, Johnson (1980, p. 145) characterizes the STURP scientists by stating: "They realize that they must not become emotionally involved or introduce any personal bias, and that the information generated while attempting to elucidate the truth must be distributed through the usual, accepted scientific channels." Arch-positivists believe that such emotional noninvolvement is really possible, but today informed scientists and philosophers are not so sanguine. Such objectivity is a chimera, as the slightest familiarity with the published literature in the philosophy and history of science for the past fifty years would make abundantly clear. Scientific objectivity results from independent testing and admission of possible subjective bias, something STURP scientists have not taken to heart.

But what about the repeated public denials by STURP scientists of the

possibility of an artist's forgery with the concomitant implicit assertion of authenticity? Here Murphy's article gives us another clue. He states (Murphy 1981, p. 43): "With respect to the hereafter the group [STURP] is an ecumenical one—among its members are Baptists, Lutherans, Mormons, Episcopalians, Jews, Roman Catholics, and agnostics." Astounded by this revelation, I called a leading STURP member who assured me that "yes, STURP did have one agnostic." One agnostic among forty scientists! What are the chances of randomly choosing forty scientists among the thousands in the United States and coming up with a group containing thirty-nine religious believers? At least one in 83 million (and I consider this a very conservative estimate!). In fact STURP is an entirely volunteer organization, and it attracted a particular type of individual: one who wanted to scientifically examine a notorious religious relic. As I wrote in a letter (which may or may not be published) to *Harper's* replying to Cullen Murphy's article: "I find it humorous that Cullen Murphy took seriously the STURP members' claims of initial skepticism regarding the authenticity of the Shroud of Turin. The fact that STURP is composed almost entirely of religious believers makes it an extremely odd group of scientists indeed, and not one you would credibly consider predisposed to skeptical behavior." I suppose some STURP members really believe that, as presumed arch-positivists, they initially approached the shroud with skepticism. But if they did, it didn't last long.

The Shroud and Biblical Criticism

The perfection, realism, and accuracy of the image of the man on the shroud has frequently drawn comments to the effect that no artist could have produced the image. Wilson (1979, p. 37) quotes Paul Vignon, a turn-of-the-century biologist who later became a professor at the Institut Catholique, Paris: "No painter, in his most elaborate work, has ever risen to such exactitude." The fact that the image is a negative and has an alleged "three-dimensional" quality led Pellicori and Evans (1981, p. 38) to claim that this puts "proponents of the deliberate forgery theory over an impossible barrel: to suggest that a Medieval artist would have the foresight to conceive of a rendition having the qualities of a photographic negative encoded with three-dimensional information is preposterous." I term statements like this *von Däniken statements,* such as "The ancient Egyptians could not possibly have built the pyramids without the aid of an advanced technology—to think otherwise is preposterous" and "The ancient Peruvian indians of the Nazca plain could not possibly construct on the desert floor perfectly straight lines that run for miles and huge animals that are visible only from high above—to think otherwise is preposterous." Perhaps Pellicori and Evans are unaware that the fourteenth-century French were building cathedrals and creating stained glass, illuminated manuscripts, sculpture, and paintings of extraordinary detail and beauty. Furthermore, the common subject matter of Gothic sculpture and painting was "determined ... by the mysticism of the period; in both arts, themes from the infancy and Passion of Christ, with emphasis on suffering and emotion, were favoured and in many cases introduced for the first time" (*Encyclopaedia Britannica, Micropaedia IV,* p. 645, Gothic art).

The striking resemblance of the image of the man on the shroud to French Gothic art has not gone unnoticed by previous commentators. But none of all the shroud articles or books appearing in recent months has pointed out that the

image's right forearm is distinctly longer than his left, or that the fingers on the right hand are unnaturally extended. Was Jesus deformed? I suppose STURP would say that "we'll never know for sure." I suppose we'll also never know for sure that Jesus was a hemophiliac, since the blood of the man on the shroud has a curious resistance to coagulation: the blood flows down his arms, down the back of his ankles, and across his back in perfectly formed rivulets without clotting. Most remarkable of all is that the blood on his head, produced by the crown of thorns, flows down his hair without the slightest tendency to mat or coagulate in the hair.

John Jackson, more than anyone else the leader of STURP, "is a believer" (Murphy 1981, p. 61). But he insists that "my responsibility is to scientific rigor." He says (Murphy 1981, p. 61):

> Somewhere along the way, you'd think a forger would have made some mistake, but there aren't any. And some of the little touches are very nice. . . . When you add up everything we know, the argument against a forgery acquires a certain force. . . . As for whether the image is Christ's, all I can say is that the wounds are consistent with the gospel accounts.

That the wounds of the man on the shroud are indeed remarkably consistent with the Gospel accounts is a frequent claim. Every article emphasizes this, especially the books by Wilson (1979) and Stevenson and Habermas (1981). Three of the most important criteria for identifying the man on the shroud as Jesus are that the legs or ankles are *not* broken (it was common practice to break the legs or ankles of crucified victims to speed asphyxiation), that the man was *nailed* to the cross (most crucified victims were simply tied to the cross), and, most important, that the image of the man on the shroud shows a lance wound in his right side that appears to have bled forth both blood and water after death, that is, the amount of blood emitted is small compared with such a wound suffered by a living person whose body would pump out sheets of blood. Indeed, the stigmata of the man on the shroud are so accurate that this is the primary evidence every author uses to claim its unimpeachable authenticity.

Before we examine these claims, it might be useful to point out that there are serious doubts that, if he existed, he was crucified; that there are serious doubts that, if he was crucified, he died; and that there are serious doubts (to say the least) that, if he died, he was resurrected. Just the beginning of the literature that supports these doubts should be read by every skeptical, if not literate, person: Blanshard (1974), Angeles (1976), Smith (1979), and Stein (1980). For my own part, let me state that I think it probable that Jesus was an authentic person. I do not base this conclusion on the so-called non-Christian sources, such as Josephus, Tacitus, Suetonius, and Pliny, which as everyone knows are spurious and interpolated (in the case of Josephus) or equivocal and ambiguous (in the case of the Roman authors). To me, the sheer idiosyncratic originality of the Gospel parables and passion story make it likely that a historical Jesus existed, or, if not him, someone else equally as original and idiosyncratic who could just as well be equated with the traditional Jesus. Whether Jesus must have been, in the inimitable logic of C. S. Lewis, either madman or Messiah, I leave for the reader to judge. My intention here is only to admit that there is *some* truth in the Gospels.

Let us examine the Gospel accounts of the crucifixion of Jesus of Nazareth. It will come as a shock to most readers that not one of the four Gospels says that Jesus

was nailed to the cross. All four say only that he was "fastened" to the cross or that he was "crucified." (These quotes and all subsequent ones are from *The New English Bible,* which is by far the most accurate translation.) The sole source for the traditional belief that Jesus was nailed to the cross is John 20:24-25, which is as follows:

> One of the twelve, Thomas, that is "the Twin," was not with the rest when Jesus came. So the disciples told him, "We have seen the Lord." He said, "Unless I see the mark of the nails on his hands, unless I put my finger into the place where the nails were, and my hand into his side, I will not believe it."

Of course, John 20:26-27 relates that a week later the doubts of Thomas were removed. Most of the articles and especially the books by Wilson and Stevenson and Habermas go to great pains to point out that the man on the shroud had his *wrists* pierced, not his hands, but the Greek word for hand can include the wrist, so the Gospel account is unimpeached. But what about the unbroken legs and the lance wound in the side. Again, these vital characteristics are found *only* in John:

> Because it was the eve of Passover, the Jews were anxious that the bodies should not remain on the cross for the coming Sabbath, since that Sabbath was a day of great solemnity; so they requested Pilate to have the legs broken and the bodies taken down. The soldiers accordingly came to the first of his fellow-victims and to the second, and broke their legs; but when they came to Jesus, they found that he was already dead, so they did not break his legs. But one of the soldiers stabbed his side with a lance, and at once there was a flow of blood and water. This is vouched for by an eyewitness, whose evidence is to be trusted. He knows that he speaks the truth, so that you too may believe; for this happened in fulfillment of the text of Scripture: "No bone of his shall be broken." And another text says, "They shall look on him whom they pierced." [John 19:31-37]

If you get the impression that John is trying awfully hard to fulfill the Scriptures, you're right. The bones being left unbroken fulfills Psalm 34:20 and Exodus 12:46. The lance wound fulfills Zechariah 12:10. Even the passage about Thomas and the nail holes in the hands and feet is intended to fulfill Psalm 22:16 (the early English translations refer to "pierced hands and feet," but the *New English Bible* gives "they have hacked off my hands and my feet" as the probable reading). The point of all this is that three of the most important or crucial characteristics of the crucifixion of Jesus are found only in John, and they appear to fulfill specific Old Testament Scripture. Was this done deliberately as a known interpolation, or was John aware of the true facts of that eventful day?

In an excellent recent article, "Resurrection Fictions," Randel Helms (1981) introduces his readers to just a sample of the way the four evangelists thought nothing of borrowing, repeating, changing, and adding to earlier sources and Gospels. In particular, after Mark wrote his Gospel, Matthew and Luke attempted to improve theirs by adding many other significant traditions and legends, especially those that tended to fulfill Old Testament Scripture better than Mark's did. They also curiously felt no inhibitions about making changes, which is why the Gospels contain so many contradictions. John's Gospel, the last, written about A.D. 100, followed the pattern set by the Synoptic Gospels of Mark, Matthew, and Luke. But John's Gospel is unique in a special sense: higher biblical criticism has found it to be so different in style, tradition, and theology from the Synoptic

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Gospels that it cannot be accepted as a valid historical source. Consider the following statements from possibly the two foremost scholars of the life of Jesus, Bornkamm and Conzelmann:

> Because a theological conception has been incorporated in the account to such an extent, this Gospel [of John] cannot be directly used as a historical source. [Bornkamm 1974]

> Conzelmann not only accepts, he applies the results of the critical-historical approach to the life of Jesus which developed over [the twentieth century]. Assumed [is] the general nonhistoricity of the fourth Gospel [of John]. [Reumann 1973]

In short, it is abundantly obvious that St. John the Divine interpolated the three Christian *traditions* of unbroken legs, lance wound, and nailing to the cross into his Gospel—traditions which had developed among Christians during the seventy years between the death of Jesus and the writing of the Fourth Gospel. The traditions had developed, of course, because they provided additional examples of fulfilled Old Testament Scripture to those of the Synoptic Gospel accounts. This is the type of evidence that writers like Wilson, Stevenson and Habermas, and all the others use in their defense of the authenticity of the Shroud of Turin. This is the same evidence that the artist who created the shroud used to make it look as realistic as possible. All parties concerned believe implicitly in the literal truth of all Gospels, and so the shroud is of use only to those who believe implicitly in the literal truth of all the Gospels. Presumably, none of these parties has any use for modern biblical criticism, but at least the shroud artist had a valid excuse for his lack of knowledge. I would be interested in learning the excuses of the others.

STURP and the Media

The lack of skepticism about the Shroud of Turin in the print media must be the most depressing aspect of the entire controversy. For a period in early October 1981, the local newspapers carried daily stories about the shroud, STURP, and the publication of Stevenson and Habermas's *Verdict on the Shroud.* Predictably, all statements about STURP and the book, and all quotations from STURP members, were pro-authenticity. In AP and UPI wire-service articles, we are told:

> The shroud is not the product of an artist. The bloodstains are composed of hemoglobin.

Human craft did not create the image on the shroud.

No pigment or substance of any kind which could account for the image on the shroud was detected by the shroud team.

Scientist are convinced that the cloth once held a dead body, which left an image of itself. It is most likely that the image was caused by some sort of scorch process. The bloodstains on the cloth are real blood.

The shroud provides at least four strong indications that Jesus probably did rise from the dead.

The facts indicate that the body was not removed from the cloth by human means because the bloodstains are intact and anatomically precise, but would have been smeared or broken if the cloth was removed by normal means.

The most probable cause found for the shroud's image was a heat or light scorch from some extraordinary occurrence not explained by natural means.

These probabilities strongly favor the authenticity of the Shroud as evidence for Jesus' death and resurrection.

In all fairness to STURP scientists, most of these quotes, especially all concerning the "resurrection" of Jesus, were from Stevenson and Habermas. Also, I was told by one STURP scientist that she was "misquoted," and two others have assured me that they still consider the idea that an artist produced the shroud to be a possibility; but these private communications are so spectacularly different from their public pronouncements and printed quotations that I refuse to participate in such a private deception. The STURP scientists should publicly admit, *at least*, that an artist could have produced the shroud and that for all their years of work they have not found one bit of reliable evidence that the shroud is authentic. Apparently, their last chance to do so is in a final summary paper by Lawrence Schwalbe and Raymond Rogers to be published in *Analytica Chimica Acta* in February 1982. Since both historically and philosophically arch-skepticism has always accompanied arch-positivism, the STURP scientists are a unique and fascinating group of individuals. This is why this book review has concentrated mainly on them and not on the books: I consider the story of the motivations and activities of the STURP scientists much more interesting than the story of the Shroud of Turin. I attribute the STURP members' credulity and lack of skepticism to their religious inclinations, and I attribute their assumed posture of scientific arch-positivism to their archaic belief of how real scientists are supposed to act. STURP needs to be studied in more detail than does the Shroud of Turin, and they deserve a book of their own (*about* them, not *by* them).

The article by Cullen Murphy for *Harper's* is not unusual for this magazine. I have fond memories of two similar articles by Tom Bethell published in *Harper's* that portrayed an equally pervasive bias and artful exclusion of damaging evidence: "Darwin's Mistake" (February 1976) and "Burning Darwin to Save Marx" (December 1978). To Murphy's credit, however, he avoids Bethell's monumental illogic and distortion of fact, and Murphy's use of scientific-equipment names and technical lingo as stylistic devices to impress his readers is far more graceful than Bethell's ponderous but unsuccessful attempt to master scientific concepts to

convince *his* readers that he knew what he was talking about. As I said earlier, Cullen Murphy empathized completely with the STURP scientists, and his long article wonderfully mirrors all the characteristics of STURP's members that I have identified. Since *Harper's* is not a scientific journal and doesn't pretend to be, I must conclude that Cullen Murphy's article is a success in presenting a sympathetic portrayal of a group of curiously misguided scientists.

I cannot be as kind to four other scientific or professional journals. *National Geographic* (Weaver 1980), *Archaeology* (Pellicori and Evans 1981), *Industrial Research and Development* (Johnson 1979, 1980), and, the most amazing of all, *Science 81* (Burden 1981) all published unskeptical pro-authenticity articles that either ignored or gave short shrift to the damaging negative evidence. These five articles are pervasively credulous and biased. Although none of them concludes outright that Jesus is the man on the shroud (to its credit, STURP has never stated this), all of them by emphasizing only the purported evidence of authenticity and by minimizing or ignoring the evidence that negates authenticity, fall into the trap of the STURP argument: since it isn't an artist's forgery, it must somehow be authentic, although we can't explain how, and if it's authentic, it must be the actual shroud of Jesus Christ, although we can never be sure. Since *Science 81* is published by the American Association for the Advancement of Science, the nation's scientific community deserves an explanation. This is particularly true because its article (Burden 1981) contains a refutation of Walter McCrone's evidence of iron earth pigment on the shroud's image, by Alan Adler and John Heller, that directly disagrees with McCrone's results. Since Adler and Heller's work is not published and McCrone's is, and since I consider McCrone's techniques and conclusions to be 100 percent reliable, I must charge *Science 81* with complicity in continuing a deception. The article (Burden 1981, p. 80) states that Adler and Heller "used fibril microchemistry and microscope magnification up to several hundred times and found no greater amounts of trace iron in the image than in the background." McCrone used these identical techniques and found a significant difference. I must admit, however, that the words "trace iron" may be a STURP equivocation, since McCrone, as we shall momentarily see, found a significant difference in amount of "iron oxide particles." Adler and Heller are simply going to have to publish their results.

Ian Wilson's book *The Shroud of Turin* is typical of a long line of pro-authenticity shroud books. He reviews all the historical, medical, and scientific evidence and concludes that, "All these conclusions ... seem sufficient to rule out the old claim that the Shroud is merely a painting by a fourteenth-century artist"(p. 245). Wilson explicitly discusses and accepts the early STURP hypothesis of "flash photolysis" in his final chapter, "The Last Miracle." As he describes it:

> In the darkness of the Jerusalem tomb the dead body of Jesus lay, unwashed, covered in blood, on a stone slab. Suddenly, there is a burst of mysterious power from it. In that instance the body dematerializes, dissolved perhaps by the flash, while its image and that of the body become indelibly fused onto the cloth, preserving for posterity a literal "snapshot" of the Resurrection. (Wilson 1979, p. 251)

Or, as one wag put it, the "first Polaroid in Palestine." The subtitle of Wilson's book is "The Burial Cloth of Jesus Christ?" but from the book's contents I am certain that we can dispense with the question mark without Wilson's disapproval.

Walter McCrone and Joe Nickell

We must be grateful that there exist two individuals, at least, who don't believe that "miracles are natural phenomena which we just don't understand" (which I swear a STURP scientist told me recently on the telephone) and that these two individuals, with the selfless dedication and self-sacrifice typical of STURP members, began their own investigations of the Shroud of Turin. Walter McCrone was in fact initially a member of STURP, but he has since resigned. While a member, he examined the sticky tape samples of shroud debris that STURP had collected during its investigation in 1978. In two papers (McCrone and Skirius 1980; McCrone 1980), McCrone demonstrated that the image and "blood" areas on the shroud contained significant amounts of iron oxide pigment particles. This iron earth pigment is a hydrous ferric oxide that varies in color from yellow or orange to red. The mineral name is hematite. It has been used as a red pigment by artists for millennia. The clear or nonimage areas of the shroud revealed no iron oxide particles at all. McCrone also found trace amounts of orpiment, ultramarine, azurite, wood charcoal, madder rose, and vermilion that had contaminated the iron oxide pigment of the image and "blood," indicating that the shroud had been produced in an artists's studio. McCrone also showed that the yellow fibers of the "blood" areas were covered by an animal protein that was used as a tempera binder for the application of the iron oxide pigment of the "blood." Unfortunately, McCrone didn't test yellow fibers of the image areas (the clear or nonimage area fibers are white) for protein, and STURP insists that their "very sensitive" protein tests on image fibers were negative. McCrone explains his actions by saying that the image and "blood" yellow fibers looked identical. However, the point is really irrelevant, as Marvin Mueller explains in his article in this issue of the SKEPTICAL INQUIRER. Whatever gelatin binder was used to transfer the iron oxide pigment to form the original image on the linen surface could have evaporated over the centuries. STURP's claim that the image is latent due to cellulose degradation and that there isn't enough iron oxide to produce an image today is probably true, but there *are* significant amounts of iron earth pigment particles all over the image and the blood, and they didn't get there by a miracle. STURP's attempts to explain away McCrone's results are so ridiculous that I won't waste space to answer them. For example, one serious STURP suggestion is that the iron is from the blood and was distributed over the shroud by handling over the centuries. McCrone answers this by pointing out that the "amount of iron in blood is about a tenth of one percent. A lot of the particles are pure hematite crystals. . . . You'd have to bleed iron oxide" (Rhein 1980).

One of the most significant McCrone discoveries is that the "blood" on the shroud contains vermilion pigment as well as iron earth pigment (McCrone 1981). Vermilion is composed of the mineral cinnabar, mercuric sulfide. Vermilion and red iron earth were the two most popular red pigments of the fourteenth century, and the shroud's artist apparently used these two to create the "blood," which today looks unnaturally red. McCrone's identification of mercuric sulfide in the pigment particles was done by analytical chemical techniques that are unimpeachable. Although STURP "scorns circumstantial evidence," as Thoreau said, "Some circumstantial evidence is very strong, as when you find a trout in the milk." I agree, some circumstantial evidence is very strong, as when you find cinnabar in the blood.

Joe Nickell (1978, 1979, 1981) has produced negative images identical, for all practical purposes, to those on the shroud. His technique is embarrassingly simple: wet linen cloth is molded to a bas relief and iron-oxide pigment is applied by rubbing when the cloth is dry. All the fourteenth-century artist had to do was carve a bas relief figure of the dead Jesus on a plank of wood, mold the wet linen on, let it dry, prepare a mixture of powdered iron earth pigment and some gelatine binder and rub this on the linen to create the faint negative image. Subsequently, the "blood" was painted on with a brush, using the vermilion and iron earth pigment mixture. Of course the artist was "cunning," but cunning individuals have lived in every age, including the fourteenth century.

A Few Loose Ends

The "three-dimensional" information that Jackson and Jumper found in the shroud is largely a creation of their own efforts, as Marvin Mueller explains in his article. I will only quote Jumper (Murphy 1981, p. 62):

> As for the image, my own opinion is that because there is such a regular mathematical relationship between image intensity and cloth-body distance, some very simple phenomenon is at work. I think we're going to kick ourselves when we get the answer and find out how simple it is.

I also find amusing Johnson's (1980, p. 148) comment: "To a great extent, the [electronic image] analyzer was able to remove the major distortions caused by the unevenness of the cloth." To a very great extent.

Father Francis L. Filas of Loyola University claims to see a coin in the image over the right eye of the man on the shroud. While others see this coin too, Father Filas also claims that he can read the inscription on the coin, and he states that it is of a type issued only during the procuratorship of Pontius Pilate. Filas has been getting a lot of newspaper publicity with his claim lately, but unfortunately no one else in the world, including all the STURP scientists, agrees with him. The weave of the cloth is too coarse for the degree of precision necessary to make out any inscription. Father Filas's imagination has been working overtime.

It is essential that carbon-14 dating of shroud material be done as soon as possible. True to the assumed positivistic character of STURP, Cullen Murphy claims only that "if carbon-14 tests showed that the shroud was manufactured during the first century A.D., it would still be just another inconclusive piece of evidence." The whole point is that a fourteenth-century date would be *very* conclusive.

Contrary to numerous claims in most of the recently published articles and books on the Shroud of Turin, no unequivocal evidence for real human blood has been found on the shroud's "bloodstains." Of course, even if this evidence was obtained, such a discovery would be irrelevant to any verification of authenticity.

Professor Allan Whanger's recently announced "discoveries" of the likeness of the shroud image's face to a sixth-century Byzantine icon and a seventh-century Byzantine coin (*New York Times,* January 28, 1982) are nothing new. In his book, Ian Wilson discusses in great detail the similarities of the shroud image's face to many Byzantine icons and mosaics of the face of Jesus. Whanger, like Wilson, believes that the Mandylion, from which the faces of Jesus were presumably copied,

was simply the Shroud of Turin folded so that only the face was visible. The error in reasoning that both of these men make is that the resemblance of the face of the shroud image to the typical Byzantine portrait of Jesus allows one to conclude that the Byzantine artists copied the face from the shroud. Rather, it is much more likely that the fourteenth-century shroud artist copied the well-known Byzantine representation of the face of Jesus.

"Verdict on the Shroud"

I have purposely saved the best for last. *Verdict on the Shroud,* by Ken Stevenson and Gary Habermas (1981), will go down in history as a classic twentieth-century example of pseudoscience, equal in every way to scientific creationism, Velikovskyism, dianetics, and ancient astronauts. The subtitle of this book says it all: "Evidence for the Death and Resurrection of Jesus Christ." But something else is written on the front cover of the dust-jacket: "The definitive book, based on new evidence from three years of intensive investigation by the Shroud of Turin Research Project." Inside, all the top STURP scientists are gratefully acknowledged, and Larry Schwalbe wrote the Foreword. Among other things, Schwalbe (p. xii) says:

> Stevenson and Habermas have [examined all the] historical, philosophical, as well as scientific arguments and have proposed an explanation that involves an intervention of the supernatural. To some people this may be shocking; yet if the authors' hypothesis is consistent with the available evidence, it remains a plausible explanation.

Plausible to whom—theists and supernaturalists? Certainly not to scientists. But Schwalbe and all the other STURP members are scientists, aren't they? Certainly Schwalbe was not including himself among those individuals who he thought might be shocked, but is he including himself among these who believe the book's proposed supernatural explanation is "plausible"?

These questions are difficult to answer, and the plot thickens quickly if you were lucky enough to find the following "clarification" in your copy of the book:

CLARIFICATION:

Verdict on the Shroud is NOT an official publication of The Shroud of Turin Research Project. While the book is based in part on scientific work done by The Project, the book was not authorized, sponsored or approved in any way by The Project and the conclusions reached by the authors are their own. They do not necessarily represent those of members of the scientific team. All of the names of members of the scientific team should be deleted from the Acknowledgements page.

For some reason, the STURP scientists are angry with Stevenson and Habermas. On the dust-jacket, Stevenson is described as "team spokesman and editor for the Shroud of Turin Research Project," which is true; however, the dust-jacket doesn't mention the fact tht Stevenson has been asked to resign from STURP. Habermas is

described as a "research consultant to the Shroud of Turin Research Project." He has not been asked to resign because, unlike Stevenson, he is not an official member of STURP. He consulted only with Stevenson, but apparently STURP's loose organization allows him to claim an affiliation. From what I have been able to

"The lack of skepticism about the Shroud of Turin in the print media must be the most depressing aspect of the entire controversy."

learn, Stevenson has so far refused to resign (can STURP fire him?). Then there is the litigation. Originally, legal proceedings were initiated by STURP to force Servant Books, the publisher of *Verdict on the Shroud,* to include the "clarification" above with each book sold and to remove the offending acknowledgments and front dust-cover statement from the second edition. But the litigation is still in progress, and nobody from STURP can (or will) tell me why or what for. Frankly, I don't really care, but it may involve money (the book is selling well, probably because of the great amount of free STURP publicity in recent magazines). STURP itself must take major responsibility for the current untenable situation the group's members find themselves in now that *Verdict on the Shroud* has been published. Stevenson was, in espionage terminology, a mole who joined the project early and always intended to write this sort of book. STURP should have anticipated this possibility and dealt with it years ago.

The book itself is hopelessly biased, although the authors try desperately to appear rational and logical throughout. Neither author is a scientist, but almost every page invokes scientific justification of one kind or another to support the authors' claims about the shroud. They assert (p. 5) that "the disbelieving view—the assumption that the Shroud *cannot possibly* be genuine—has its source in something other than scientific reasoning." I agree: this view has its source in common sense. The authors' knowledge of epistemology is flawed. They make the following remarkable statement (p. 10):

> We—and the reader—cannot prejudice our study by rejecting the miraculous *a priori,* assuming that supernatural events cannot occur. In other words, our treatment of this subject will be balanced. We will avoid both a pious approach, which interprets every fact as proof of the validity of the Shroud, and a skeptical approach, which refuses to view the evidence objectively.

Such an understanding of the "skeptical approach" may surprise some readers, but we can easily understand Stevenson and Habermas's purpose (p. 8):

> In an age when science is making faith in the gospel difficult, science may be going as far as it possibly could to provide evidence for the gospel's validity.

Gary Habermas is a minister in the United Brethren Church and a professor of

"The STURP scientists should publicly admit, at least, that an artist could have produced the shroud and that for all their years of work they have not found one bit of reliable evidence that the shroud is authentic."

apologetics and philosophy at Jerry Falwell's Liberty Baptist College in Lynchburg, Virginia. In a recent New York Times News Service article, Edward Fiske wrote the following:

> In his freshman introduction to philosophy course, for example, Gary Habermas uses a textbook whose authors declare that it is important not only to "present every position as fairly as possible" but also to refute "views that are anti-Christian." On a recent afternoon, Habermas took attendance and then opened his class with a prayer that God would "give us insight into agnosticism." He then lectured his 32 students on various forms of modern agnosticism, with hints on how to deal with such attitudes. "A good way to answer a skeptic is not to find fault with this or that point but to say, 'Here is my basis for what I know is right,'" he suggested.

Stevenson and Habermas do not follow this approach in their book; contrary to their earlier quoted goal, they treat every fact as proof of the shroud's authenticity and go to great lengths to find fault with all conflicting evidence. For example, the Gospel of John says that Jesus was wrapped in burial linens, not simply covered by a shroud, as other Gospels state. The authors explain this and everything else away.

I particularly noticed one amusing item among many in the book. On page 157, Dr. Robert Bucklin, a medical examiner and one of the STURP members who sued to have his name removed from the acknowledgments, is quoted as claiming: "The medical data from the Shroud supports the resurrection. When this medical information is combined with the physical, chemical and historical facts, there is strong evidence for Jesus' resurrection." In Burden (1981, p. 80) Bucklin states that "the shroud's markings depict an expanded rib cage and drawn-in hollow below it, which would be the case if the man died while hanging by the arms." Stevenson and Habermas, however, prefer the view of Dr. Pierre Barbet (1953) and refer to him when they state (pp. 39, 45):

> [Jesus] was already dead, as his swollen abdomen clearly indicates. Again, it is interesting to note that most paintings or sculptures of the crucifixion show Jesus with a sunken belly. Artists did not know the medical signficance of a swollen abdomen. . . .

His swollen abdomen indicates that he died by asphyxiation, the way crucified victims died.

Were Drs. Bucklin and Barbet looking at different shrouds, or did each see just what he wanted to see? Or were Stevenson and Habermas just being perverse in using Barbet's "swollen abdomen" opinion rather than Bucklin's "drawn-in hollow below the rib cage" opinion, especially since Dr. Bucklin was generous enough to state that in his view the medical evidence supported the factuality of the resurrection. Or perhaps the abdomen isn't below the rib cage?

To their credit, Stevenson and Habermas have included a chapter entitled "The Naturalism-Supernaturalism Debate: Do Miracles Occur?" Unfortunately, they decide for the affirmative and claim that STURP's scientific evidence is justification for believing in the supernatural. This explicit endorsement of pseudoscience should be enough for one to form a reasonable opinion about the book. Marvin Mueller, in his article, speculates on the motivations of the STURP scientists. I shall do the same for Stevenson and Habermas. The local Catholic bookstore sold out quickly of *Verdict on the Shroud*, but they assure me that a new stock will arrive soon. The second printing is already in press. In the fourteenth century, Jeanne de Vergy and the Lirey clergy made money by exploiting a religious relic venerated by credulous pilgrims. Even through six centuries, some things never change.

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Scientific Cranks

... No crank wants, or will accept, an honest criticism of anything. He has solved the "problem," whatever it is, and is looking for an endorsement.... Whatever else cranks may be up to, after one deals with several it becomes clear that they are not really interested in doing science. They are not prepared to accept the rough-and-tumble of scientific criticism; any criticism is regarded as a provocation and a threat.

—*Jeremy Bernstein, "Scientific Cranks: How to Recognize One and What to Do Until the Doctor Arrives,"* American Scholar, *vol. 48, Winter 1977-78. (Also to appear in Bernstein's new book, Science Observed,* Basic Books.

Zodiac and Personality: An Empirical Study

50,000 character traits systematically collected from the biographies of 2,000 successful subjects give negative results.

Michel Gauquelin

According to astrology, the twelve signs of the zodiac exercise different influences on people at the time of birth. When crossing any of the signs, the sun, the moon, the planets, and the "ascendant" (the rising sign at the time of birth) play distinct roles. Each sign is related to a type of character or destiny. Is that true? The aim of the present study is to answer the question with some empirical evidence.

Introduction

In 1978, we conducted statistical experiments testing the possible influence of the zodiac on professional success. Results were entirely negative (Gauquelin 1978). These studies were based upon a sample of 15,560 births of successful Europeans divided into ten professional activities. The names of the persons were compiled from directories or similar publications, and the birth data (date, time, place) were obtained from official records. All the data were published by our laboratory in six volumes (Gauquelin 1970).

As one can imagine, these observations were criticized by astrologers, who felt that they lacked substance and failed to get to the heart of the problem. Astrologers claimed that professional success is far too crude a criterion to reveal the astral subtlety of zodiacal influences, which are much more effective on personality than on success. They said they would not accept our negative verdict unless we could prove, case by case, collecting

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character traits from biographies if necessary, that zodiacal influences do not exist. We decided to test the affirmation on a large scale, using an objective methodology.

Methodology

The character-traits material. We proceeded like this. We used the same set of people as before. This time, we collected their biographies. In 1968, we devised a way of using biographies objectively. We based our method on the idea that there are permanent traits of character such as defined by J.P. Chaplin in his *Dictionary of Psychology:* "a relatively persistent and consistent behavior pattern manifested in a wide range of circumstances." For each trait we opened a file, carrying on one side the subject's name and on the other the position of the horoscopic factors of his birth. What we did for one subject, we repeated for other celebrities, using published accounts of their personality. This gives us files on 52,188 personality traits taken systematically from biographies of 2,000 subjects—sports champions, actors, men of science, and writers. Let us note that the use of biographies and personality descriptions in ordinary language is a classical approach employed or praised by the leading specialists in the field of the psychology of personality (Allport and Odbert 1936; Bromley 1977; Cattell 1965; Eysenck 1970). To ensure the objectivity of the study we achieved a certain unity in all the biographical material. We never eliminated a biography and we considered every trait mentioned in every biography. It took several years to conduct this study. Data were published by our laboratory in four *Psychological Monographs* (Gauquelin 1973, 1974, 1977). Each monograph gives a description of the method used, the full catalogue of the personality traits, and all the biographical references from which these were culled. Astrologers can easily verify the value of our material.

Zodiacal positions at the births of our subjects were computed, and a sophisticated computer program allowed us to analyze the data collected as objectively and minutely as possible. We thank Neil F. Michelsen, president of *Astro Computing Services,* San Diego, California, and his research director, Thomas Shanks, for their invaluable help in this matter.

Having at our disposal a large catalogue of character traits, together with the horoscopic data, we were ready to test a possible correlation between zodiac and personality.

The astrological key words. From among the numerous astrological textbooks in our library, we selected eight. The criteria of selection of the books were: (*a*) the renown of the textbook and (*b*) a reasonable amount of psychologically oriented key words. Several well-known books could not be included in our study because they do not give clear, short key words in their description of the psychological influence of the signs. This explains why, for instance, Dane Rudhyar's *The Astrology of Personality* was not

retained. Ancient authors could not be analyzed because their old-fashioned terminology does not contain enough of the key words found in our traits catalogue, which was compiled from modern biographers. The eight books chosen were:

The Principles of Astrology, by Charles Carter (1925)
The Modern Textbook of Astrology, by Margaret Hone (1951)
Défense et Illustration de l'Astrologie, by André Barbault (1955)
Astrological Keywords, by Manly Palmer Hall (1958)
Teach Yourself Astrology, by Jeff Mayo (1964)
Dictionary of Astrology, by Dal Lee (1968)
Keywords, by Paul Grell (1970)
The Round Art, by A.T. Mann (1978)

Based on our experience, we did not think it necessary to add any more books, since astrological tradition is consistent and all "serious" authors give more or less similar descriptions of the alleged astral influences.

In each of these eight books, we looked for the chapter devoted to the description of the zodiacal influences of the 12 signs. Then we established a list of the key words describing these influences and checked to see if they were present in the traits catalogues of our *Psychological Monographs*. A majority of them were present and were used for testing zodiacal effects.

Let us give an example. In Margaret Hone's *The Modern Textbook of Astrology*, Chapter 4 is called "The Zodiacal Signs." Pages 49 and 50 describe "The Predominantly Aries Person" using character traits or behaviorial expressions. Here is the first paragraph of what Margaret Hone says about the Aries person: "He is very much of a firebrand or battering-ram. He will forge his way through life with courage, daring, energy and initiative and enterprise. He is the true pioneer. His one-pointedness of aim makes him direct and unable to use subtlety. He is incisive and often satirical in speech, cutting in invective."

Among the character traits listed in this paragraph, we looked for those that are also present in the catalogue of traits describing the subjects of our experimental sample. Eleven of them were found: courageous, daring, energetic, initiative, enterprising, pioneer, direct, subtle (not), incisive, satirical, cutting. Each of these traits is associated, in our catalogue, with the names of notable subjects to whom their biographers had attributed the trait. Thus "courageous" describes the personality of sports champions, actors, scientists, or writers in our sample 378 times. At the birth of these subjects, we noted the positions of the horoscopic factors in the 12 signs of the zodiac. Since "courageous" is a key word describing the Aries personality, special attention was paid to the position of the celestial factors in Aries.

This procedure was applied to all the key words of Aries according to Margaret Hone; the same analysis was carried out for the other eleven signs, Taurus, Gemini, Cancer, etc., also described by M. Hone; and we

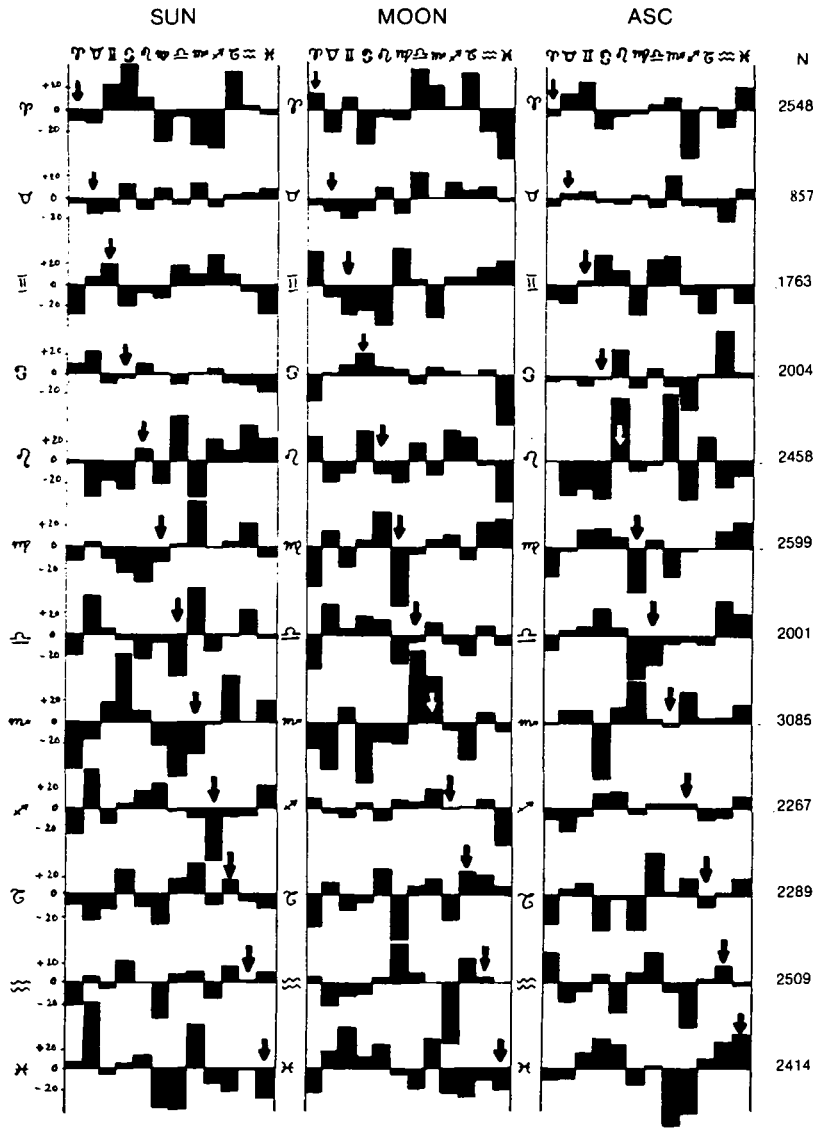

FIGURE 1. Zodiacal signs (keywords from Mayo) tested by the character traits analysis.

followed the same process with the seven other astrologers under investigation.*

Astrologers say that the traits of a sign are often found in the

*The complete list of the astrological key words for each sign, according to each of the eight astrologers' textbooks, is published by our laboratory in a special report devoted to this study (Gauquelin 1981).

personality of the subject when this sign is "strong" in the subject's horoscope. Margaret Hone, for instance, speaks about "the predominant Aries personality." What does "predominant" mean? There is general agreement on this question among astrologers. A sign is "predominant" if one or several prominent horoscopic factors were in that sign at the moment of birth. The sign occupied by the sun, the moon, or the ascendant is said to be of paramount importance in imprinting its character on those "born under" it. Accordingly, we paid special attention to these three astrological factors in our statistical analysis of the results.

Results

Analysis by sign and by astrologers. The adjectives actually used by the eight astrologers to describe the characteristics of the signs were noted and the question was asked: In what sign do the people to whom these adjectives are applied by the biographers have the sun, the moon, and the ascendant? "If astrologers are right, one might expect that signs would show a good correlation and that those who had the sun, the moon, or the ascendant in a sign would in fact be described by the words applied to that sign. One would even expect that the correlation between the two would often be the best of the twelve possible correlations in each case" (Addey 1980).

An analysis of the data for each sign given in the eight textbooks is shown in Table 1. How many times are actual horoscopic frequencies greater than (+) or less than (–) expected for each sign at the birth of people who are described by the key words applied to that sign? Since we have 96 trials (12 signs for 8 astrologers), chance predicts 48 positive results and 48 negative results. For the sun, 40 positive results were found against 56 negative ones; for the moon, 41 positive and 55 negative results; for the ascendant, 50 positive and 46 negative. The total turns out to be sharply against the influence of the signs, with 131 positive scores and 157 negative scores (average 144).

Table 1 also gives the results of the study for each sign and for each astrologer taken separately (data for sun, moon, and ascendant added). Here again the results are discouraging for the true believer. No sign scores significantly higher than expected by chance. The "bad" value of Libra has no more significance than the relatively "good" value of Aquarius. We can make the same comments looking at the results for each astrologer.

The total disarray of the interpretation of astrologers is more visible in the diagrammatic form of Figure 1, which shows the results in relation to the adjectives given by Mayo, taken as an example. It gives the sun, moon, ascendant 12-sign distributions at the birth of the subjects described by the words applied to Aries, Taurus, Gemini, etc. (the total "word count" for each sign being given on the extreme right of the figure). The values are published in terms of differences between the actual and expected frequen-

TABLE I

Zodiacal Key Words According to Eight Astrologers

How many times actual frequencies are greater than (+) or less than (-) expected frequencies at the birth of people described by the words applied to that sign.

Sign	Sun		Moon		Ascendant		Total for each sign		Total for each Astrologer		
	+	-	+	-	+	-	+	-		+	-
Aries	1	7	7	1	5	3	13	11	Carter	17	19
Taurus	1	7	2	6	5	3	8	16	Hone	16	20
Gemini	6	2	1	7	7	1	14	10	Barbault	13	23
Cancer	4	4	6	2	2	6	12	12	Hall	18	18
Leo	6	2	1	7	6	2	13	11	Mayo	14	22
Virgo	5	3	0	8	2	6	7	17	Lee	17	19
Libra	3	5	2	6	0	8	5	19	Grell	18	18
Scorpio	2	6	5	3	4	4	11	13	Mann	18	18
Sagittarius	3	5	2	6	2	6	7	17			
Capricorn	7	1	6	2	2	6	15	9			
Aquarius	2	6	7	1	7	1	16	8			
Pisces	0	8	2	6	8	0	10	14			
Total	40	56	41	55	50	46	131	157		131	157
Average	48		48		48		144			144	
Probability	n.s.		n.s.		n.s.		n.s.			n.s.	

n.s. means: not significant at the .05 level.

cies. For each distribution, an arrow shows where the maximum of births should be to vindicate the reality of zodiacal influences. Obviously the results for Mayo are disastrous. In actual fact there are more cases where the appropriate correlation is the worst of the 12 signs (the sun in Libra and Sagittarius, and the moon and the ascendant in Virgo) than where it is the best (the moon in Cancer and the ascendant in Leo). Looking at the details, there are also striking psychological contradictions. For instance, the key words of the aggressive and passionate Aries and Scorpio correspond to a maximum of subjects born with the sun in Cancer, a sensitive and dreamy sign; and so forth.

We have not included diagrammatic figures for the other astrologers because their features are very similar to those of Mayo's and equally disastrous.

Most textbooks give very similar descriptions of the signs, and there is no reason to think that the eight textbooks chosen are in any way unrepresentative. The plain fact is that it is not Mayo, or Carter, or Barbault, or some other astrologer who is wrong. It is astrology itself.

The sidereal zodiac. In the United States and England, a school of astrologers decided relatively recently to take account of astronomers' objections concerning the role of the precession of the equinox, which has shifted back the constellations by more than three-quarters of a sign since antiquity. Consequently, these astrologers say, the real zodiac is the "sidereal" zodiac, which follows the precession of the equinox, and the "tropical" zodiac used by traditional astrologers is a false one based only on appearances. Example: A subject born on the first of April is generally said to be born with the sun in Aries, but the "siderealists" claim he is actually born with the sun in Pisces because it is now the constellation Pisces that is beyond the traveling sun at the beginning of April and no longer the Aries constellation. If you remember that "Aries" subjects are said to be full of energy and decision and "Pisces" subjects are said to be dreamy and dislike making decisions, you see how the two interpretations can be in striking contrast.

We do not intend to come into the tropical/sidereal controversy among astrologers. But we can bring some empirical arguments to the debate by carrying out the same analysis for the sidereal zodiac that we did for the traditional, tropical one. This new experiment was performed using the constant help of Astro Computing Services for the calculations. It can be summarized very briefly: The sidereal zodiac does not give better

How to Compute the Expected Frequencies in This Study

Example: expected frequency for the sun in Aries according to Mayo's key words.

Each trait for each person found in a biography constitutes a unit. The published "Psychological Monographs" contain a total of 52,188 such units. It is these data that constitute the raw material for our calculation.

Checking these 52,188 units we found the sun in Aries 4,151 times, the proportion being 4151/52188 = 0.07954.

Of the total number of traits, 2,548 were selected as characteristic of an Aries personality according to Mayo's key words; thus, the theoretical frequency for the sun in Aries is 2,548 x 0.07954 = 202.67.

The actual number found is 194.

The difference between the actual and expected frequencies is - 8.67.

The same procedure was followed for calculating the expected frequency of each horoscopic factor in each sign according to the astrologers' key words.

results than the tropical zodiac. No positive correlation was found between the key words given by astrologers and the character traits of the subjects born with the sun, the moon, or the ascendant in sidereal signs. The sidereal zodiac for Mayo's words, for instance, gives the same results as the tropical one, 14 plus and 22 minus (average 18). Scores for the other astrologers are no better.

Discussion

The results of our study are clear-cut and need few comments. There is no correlation between character traits of the subjects and the signs under which they were born. In our previous studies, we had already found that there was no correlation between professional success and zodiac and no zodiacal-sign "heredity" between parent's and child's horoscopes (Gauquelin 1978, 1979). All this presents a large body of experimental evidence against the alleged influences of the twelve signs.

Our observations are consistent with several independent studies that tested possible sign effects: no significant correlation has been found. Among the abundant literature on the subject, some recent appraisals can be mentioned (Kelly 1979; Jackson and Fiebert 1980; Eysenck and Nias 1981) and several articles that have appeared in the SKEPTICAL INQUIRER [McGarvey, Spring/Summer 1977; Bastedo, Fall 1978; Mechler et al., Winter 1980-81; Kelly, Summer 1981; Lackey, Fall 1981]. Even in serious astrological circles, a shadow of a doubt is emerging and the reality of sign effects is occasionally questioned. The most open-minded astrologers do not try to cover up proofs against sign influences (Addey 1980). Moreover, in a detailed survey of the astrological literature, two astrologers pointed out recently the dubious value of the so-called proofs claimed by astrologers themselves in favor of the signs (Dean and Mather 1976). In 1978, Dean even launched a prize of £500 to the benefit of the first author able to bring a scientific proof of the reality of zodiacal influences. Nobody was the winner of the prize. Of course, despite the pressure of the facts, almost all of the astrologers are still continuing to believe in signs. They are wondering how they could survive, as practitioners, a horoscope without a zodiac. For our part, we are wondering how the horoscope itself could survive such a fatal blow.

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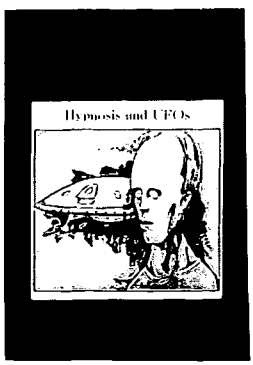

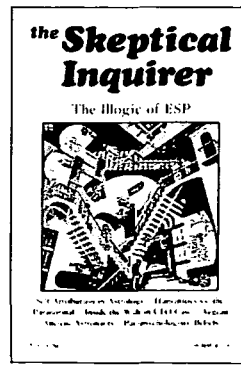

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Book Reviews

Project Identification: The First Scientific Field Study of UFO Phenomena. By Harley D. Rutledge. Prentice-Hall, Englewood Cliffs, N.J., 1981. 265 pp. $10.95.

Reviewed by Robert Sheaffer

Project Identification is the story of a UFO investigative group of the same name, founded and headed by Harley D. Rutledge, chairman of the Physics Department at Southeastern Missouri State University at Cape Girardeau. However, Project Identification differs from most UFO organizations in being principally a UFO *observation* group, only secondarily investigating the reported sightings of others. Contrary to what one might have expected, the group has reportedly seen a substantial number of UFOs. During 1973, the best year thus far, one UFO was seen for every three hours of observation. At first, UFOs were seen only on field trips in the vicinity of the town of Piedmont, which was experiencing a local "flap." Then, as Rutledge's powers of observation were sharpened, he began to see UFOs closer to home, ultimately seeing many of them from his own front yard, and even out the window of his office at the Magill Hall of Science. His son reported seeing more than 60 UFOs from the yard, but Rutledge, ever the scientist, decided against including them in the Project Identification figures on the grounds that the boy was not yet sixteen years old, and hence not eligible for membership.

Most of the UFOs described are of the type generally known as "nocturnal lights," usually held by UFO proponents to be the least interesting and least convincing type of UFO report. The errors of perception that can creep into an account of a featureless light seen against a dark sky are well enough known that the major UFO groups seldom assign much importance to reports of this type. But Rutledge and the other members of Project Identification (who are required to have college training or equivalent experience in one of the physical sciences) have prepared a compendium of observations that are bizarre if taken at face value: the Random Flashbulb effect, pseudostars, hovering lights, and even a classic daylight

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flying-saucer. (Rutledge is miffed that J. Allen Hynek, when visiting Piedmont, said, "You have to disregard any light on the horizon." Some of the project's best UFOs are in that category.)

Rutledge is utterly convinced that the group "interacted with the phenomenon under study," and claims that it had "an intelligence equal to or greater than that of man." UFOs reportedly avoided the observing stations, heading directly toward them but suddenly turning away. When the position of the observing station was changed, the UFOs reportedly altered their customary flight-paths accordingly. Rutledge began to suspect that "some sightings were staged for me when I was alone." In two cases, he suspected that "telepathy" may have been involved, although he allows as an alternative explanation that "the UFOs were able to drift silently near our positions at night and listen to our conversations."

One's suspicions are immediately raised that the extraordinary characteristics attributed to these UFOs are not factually correct, and in a closer examination of Rutledge's claims the errors of fact begin to become apparent. One of the first UFOs sighted was dismissed by a skeptic, who also saw it, as an automobile far off on the horizon. Rutledge attempts to refute this by calculating that, if it had been a pair of headlights, the telescope through which they observed it would have resolved the image into two distinct headlamps at a distance of up to forty miles. But he utterly ignores the effect of atmospheric turbulence and scattering, which distorts distant images and destroys a telescope's power of resolution. This is not the kind of argument one expects to hear from a physicist. For another UFO, it is claimed that more fine detail of the object's supposed motion was captured by a 50 mm lens than by an 800 mm lens in the same place at the same time. This violates every law of optics and should have been an immediate tip-off to any scientist that the supposed fine movements of the object were due entirely to camera motion. This is as absurd as supposing that an observer a mile away from an object can see more detail than someone a half-block distant. Surely Rutledge did not earn his Ph.D by fuzzy thinking like this.

In his closing remarks on the subject, the author tells us his suspicion that "UFOs actually dart about in daylight at speeds at which they cannot be seen." He also says he is "certain" that "Missouri National Guard helicopters were in search of UFOs." Rutledge is one of the few UFO proponents to give any credence to the wild stories that UFOs are the secret weapons developed by the Nazis during World War II, assertions that "seemed to be substantiated by an article appearing in *Saga* magazine." (*Nothing* is substantiated by articles in *Saga*.) He relates how the Nazis reportedly flew off in their saucers to secret bases in Antarctica and observes that "scientific expeditions to Antarctica have reported UFO sightings there."

There is no reason to doubt Rutledge's sincerity as he rattles off accounts of one mystifying sighting after another. However, UFOlogists are finally being forced to come to grips with the extraordinary propensity of witnesses to report what they have seen incorrectly (see especially Hendry, *The UFO Handbook*). To the critical reader, it is painfully, even embarrassingly, apparent that the story of *Project Identification* is, from start to end, a massive exercise in self-delusion.●

The Second Book of the Strange. By Laurence D. Gadd and the Editors of The World Almanac. World Almanac Publications, New York, 1981. 341 pp., paperback, $7.95. Prometheus Books, Buffalo, N.Y., 1981, cloth, $16.95.

Reviewed by George Fergus

This book is not a new edition of *The World Almanac Book of the Strange* (reviewed in *SI*, Spring-Summer 1978, pp. 102-05) but rather a completely new volume, consisting primarily of material that was not covered in the original book.

There are new sections on spontaneous human combustion, moon madness, psychic archaeology, acupuncture, cloning, limb regeneration, cryonic preservation of the dead, and similar items of popular interest that were unaccountably missing from the earlier book. On the whole, the evaluations are balanced and based on accurate information. Since they are necessarily brief, it is also important that references are given for further reading, and I am pleased to say that there are more references to debunking articles (many of them from the SKEPTICAL INQUIRER) than were present in the first book.

This second volume also presents some excellent updates on subjects covered in the earlier book. For example, it points out that the alleged 130-year-olds living the simple life in remote mountain villages are simply lying about their ages and that "out-of-body experiences" can readily be explained as hallucinations occurring during periods of hypnagogic sleep. Its coverage of the perennial controversies over UFOs and parapsychology seems very well done, although it does fail to warn that the random-event generators used in modern tests for precognition and the ultrasensitive devices used to test for psychokinesis may be subject to a nonrandom bias due to small imperfections in the equipment and should therefore be checked by the insertion of frequent test trials among the actual experiments.

As is to be expected, however, some of the discussions are disappointingly one-sided. The sections on negative air ions and hot-blooded dinosaurs, for example, make specific citations only to works by proponents, even though skeptical treatments are readily available. There are also no corrections to the earlier volume's rather one-sided discussions of Kirlian photography, psychosensitive plants, Bimini blocks, dowsing, Carlos Castaneda, and other subjects.

Also, apparently, "scientific creationism" has progressed to the point that a book about strange phenomena has to include a section on evolution. Whatever the reason, this section includes the book's greatest number of lapses into nonsense, apparently the result of cobbling the information together solely from newspaper and magazine clippings. Here we find that "only one present-day primate, the Howlever monkey, stands out as a possible candidate for the missing link." This appears to be a garbled reference to the Howler monkey of South America, whose genetic link to a direct human/ape ancestor is so tenuous that any similarities would most likely be due to convergent evolution.

This section also informs us that living organisms' ability to evade the Second Law of Thermodynamics by use of external energy sources not only is strange but is

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"one of the basic conundrums of science." Actually, the explanation is well-known—life decreases its own entropy by increasing the entropy of its food and the rest of its environment. Ilya Prigogine's Nobel-prize-winning contribution, described here incorrectly as the discovery of a "loophole" in the Second Law, is his extension of the theory of thermodynamics beyond simple "closed" systems so that chemists now have the tools to start analyzing living biological systems.

It is further stated that we will be able to re-create extinct species as soon as "geneticists succeed in extracting viable genetic material from fossil or frozen remains." Whoever wrote this obviously hadn't read the section on clones a few pages earlier, which points out that no one has even succeeded in producing a copy of any *living* adult vertebrate.

Perhaps oddest of all, it never does get around to even *mentioning* creationism.

Some of the topics have not been brought completely up to date with current knowledge. The section on ball lightning does not mention James Barry's duplication of this phenomenon in the laboratory, nor does the section on regular lightning explain why an electric charge builds up in the first place. The discussion of olfactory communication does not make the necessary distinction between ordinary smell and the operation of the vomeronasal system. The description of the legendary Amazons fails to make any reference to the historical and archaeological evidence for women warriors among the ancient Sarmatians. The update on the Shroud of Turin totally ignores Walter McCrone's identification of an artificial red pigment in particles lifted from the shroud, as well as Joe Nickell's creation of strikingly similar images by a rubbing technique that could easily have been employed by a medieval artist.

It is disappointing that the discussion of continental drift does not make it clear that key elements of Wegener's original theory (such as the motive force and the rate of drift) were shown to be incorrect—that the theory wasn't rejected solely because of the hidebound conservatism of the scientific establishment.

Although there is a new section on legendary creatures, there is still a surprising lack of coverage of the various scientific explanations for unusual legends, particularly the supernatural phenomena described in the Bible. But perhaps this would require a whole book by itself.

I don't know if the editors are still looking for suggestions like these, since the present volume does not repeat the request for queries and criticisms that was printed in the earlier book. This may signal a change in policy, the editors being tired of the type of mail they've been getting. I would like to have seen at least a preface describing the sorts of comments sent in by readers of the first volume, but the present book is totally devoid of introductory material. It does have an index, however, which was annoyingly absent in the earlier book.

In sum, this book has pretty much the same virtues and faults as the first one, and thus includes enough diverse information to be worth buying despite its flaws. ●

Some Recent Books

Listing here does not preclude more detailed review in a future issue.

Abell, George O., and Barry Singer, eds., *Science and the Paranormal: Probing the Existence of the Supernatural.* Scribner's, New York, 1981, 414 pp., $17.95. A clear, even-handed, authoritative examination of fringe-science and the paranormal from a scientific point of view. Twenty essay articles by 19 scientists and writers: Gardner on parapsychology and quantum mechanics, Singer on Kirlian photography, Hyman and Randi on scientists and psychics, Asimov and Siegel on life after death, Abell on astrology and moon madness, Sagan on Velikovsky, Krupp on pseudomysteries of the past, Klass on UFOs, Kusche on the Bermuda Triangle, Nolen on psychic healing, Cohen on monsters, Galston and Slayman on plant perception, and Khalil and Kurucz on biorhythms. Two concluding chapters by astronomer Frank Drake and physicist Philip Morrison deal with the positive side of science's *real* mysteries. An excellent, readable scientific perspective on popular mysteries and misconceptions.

Alcock, James E. *Parapsychology: Science or Magic?* Pergamon Press, Elmsford, N.Y., 1981, 224 pp., $17.95. A critical perspective on parapsychology by a psychologist knowledgeable about the pitfalls and biases of belief. Approaches the subject with two questioning themes: What are the central—and very fundamental—problems with parapsychology, its methods, data, and theory (or lack of it) that prevent it from achieving acceptance within the scientific community; and if psi phenomena do not exist, what psychological factors account for the persistence of belief in them? An important look at essential issues.

Cohen, Daniel. *The Great Airship Mystery.* Dodd, Mead & Co., New York, 1981, 212 pp., $9.95. An examination of the "mysterious airship" sightings of 1896 and 1897. An entertaining look at a nineteenth century "UFO" flap. In his final chapter the author concludes that, suggestions of "real" UFOs and paraphysical explanations to the contrary, the great airship mystery probably grew out of mistaken identification of natural phenomena combined with intentional hoaxes. He draws parallels with UFO reports of today.

Forrest, Bob. *Velikovsky's Sources: Part 1* and *Velikovsky's Sources: Part 2.* $12.00 for the two. (U.S. residents may order from and make checks payable to Robert J. Schadewald, Rte. 1, Box 129, Rogers, MN 55374.) An interesting and long-needed examination of Velikovsky's use of historical sources. Among the author's purposes is "to show that much of the 'evidence' for the scenario of *Worlds in Collision* is the product of a . . . process of selection and rejection and to demonstrate that a different picture emerges when Velikovsky's evidence is read not in the forms in which it is presented in *Worlds in Collision* but in its original contexts."

Moore, Brooke Noel. *The Philosophical Possibilities Beyond Death.* Charles C. Thomas, Springfield, Ill., 1981, 222 pp., $22.95. A philosopher's critical examination of the purported evidence of after-death survival. Although his conclusions are essentially negative, his approach is mild and nonhostile to believers' sensibilities.

—*Kendrick Frazier*

Books In Progress

Evolution and Creationism

A number of books by scientists and writers dealing with scientific, political, or social aspects of the evolution/creationism controversy are in press or in progress. Stan Weinberg, national coordinator of the network of state Corresponding Committees on Evolution (see News & Comment, this issue), provided information about them.—ED.

University of Massachusetts anthropologist **Laurie Godfrey** (familiar to SKEPTICAL INQUIRER readers for her article on anti-evolution propaganda in our Fall 1979 issue and author of a recent *Natural History* article on the subject) is editor of *Scientists Confront Creationism* (W. W. Norton, 1982). Contributions by leading scientists are aimed at specific creationist arguments. Godfrey is also working on a book for Allyn & Bacon on current controversies in evolution, not addressing creationism per se but including one chapter on the subject.

Princeton anthropologist **Ashley Montagu** is editing a work by 18 authors (Oxford University Press, Summer 1982) giving broad coverage of specific arguments and issues for the general reader. **Michael Bentley** (Roanoke Valley Science Museum) and **Robert Bordeaux** (Biology Dept., Hollins College, Va.) have completed a work for school-boards, teachers, and mainline Christians. It deals with educational issues, the history of creationism, synopses of major court cases, synopses of both positions, plus their educational recommendations (pro-evolution). By the time this appears the book should have been released from Cambridge Publications, Charlottesville.

Philospher **Michael Ruse** is author of *Darwinism Defended: A Guide to the Evolution Controversies,* due from Addison-Wesley in early 1982.

Niles Eldredge (American Museum of Natural History) has a work going into production with Pocket Books of Washington Square Press. An expansion of his *New Republic* article on the subject, it will deal with what is and what is not science, contemporary controversies *within* evolution, and creationist activities. **William Mayer** (Biological Sciences Curriculum Study) is editing a book by scientists analyzing specific creationist arguments and intended for school boards, legislators, teachers, and parents.

Norman Newell (American Museum of Natural History) has completed a book aimed at the religious community. It will deal with what science is and with the scientific method, the difficulties of interfacing Bible and science, and interpretational matters. Publication expected in Spring 1982. **Robert Schadewald** (author of the article on the similarities among creationists, flat earthers, and geocentrists in our Winter 1981-82 issue) hopes for publication in 1982 of his book on creationism, its leaders, creationist propaganda methods, and why creationism is a pseudoscience. It also will deal with such specifics as flood geology, the age of earth, the debating and legal tactics of creationists, and comparisons with earlier Bible-science movements.

A new book by zoologist **Doug Futuyma** (SUNY, Stony Brook) for laymen, teachers, and nonscientist educators is targeted for publication by Pantheon in Fall 1982. It addresses what we understand about evolution and why, plus creationist

arguments. Zoologist **Warren Dolphin** (Iowa State University) is coordinator of a 13-chapter work dealing with various aspects of scientific creationism that will summarize the Iowa experience and probably treat the national legislative scene. **Allen Stairs** (History and Philosophy of Science, University of Maryland) is in the early stages of editing a book treating the broader philosophical issues, such as falsifiability, use of "theory," "fact," and "hypothesis," backgrounds of religious controversy, Bible scholars' current approach to Genesis, theological concerns raised by humanism and evolution, and legal matters of creation versus evolution.

The vacuum of books on evolution specifically intended to help the public deal with the tactics and misstatements of creationists is about to be filled.

—*K.F.*

Articles of Note

Asimov, Isaac. "The 'Threat' of Creationism." *New York Times Magazine,* June 14, 1981, pp. 90-101. Excellent and comprehensive. Outlines the seven major arguments of the creationists and corrects the misconceptions proffered by each. "To those trained in science, creationism seems like a bad dream, a sudden reliving of a nightmare, a renewed march of an army of the night risen to challenge free thought and enlightenment."

Bernstein, Ellen. "Lourdes." In *Encyclopaedia Britannica 1982 Yearbook of Medicine and Health,* pp. 129-47. A critical examination of the healing "miracles" that attract ailing pilgrims to the cathedral in northwestern France.

Cherfas, Jeremy. "Paranormal-Watchers Fall Out Over the Mars Effect," *New Scientist,* Oct. 19, 1981, p. 294. Balanced report on the Rawlins/Gauquelin/CSICOP Mars-effect controversy discussed in our Winter 1981-82 issue.

"The Creationists," special section in *Science 81,* December 1981, with articles on creationism as a social movement, "The Genesis of Equal Time" by John Skow, and creationism as science, "A Farewell to Newton, Einstein, Darwin ..." by Allen Hammond and Lynn Margulis, plus sidebars on the impact on education and what the creationists say. Fairly direct and hard-hitting.

Crowe, Michael J. "New Light on the Moon Hoax." *Sky and Telescope,* November 1981, pp. 428-29. Following on David S. Evans's two articles on the Great Moon Hoax of 1835, in that magazine's September and October issues, Crowe presents evidence that the series of *New York Sun* articles about life forms observed on the moon was not a hoax at all but a satire.

Dahlin, Robert. "A Tough Time For Textbooks." *Publishers Weekly,* Aug. 7, 1981, pp. 28-32. Report on the battles educational publishers are having to fight against conservative pressure groups, including the creationists' attempts to limit references to evolution.

Eagar, Harry. "How Psychic Is Greta Alexander? Not Very, Her Track Record Shows." *Des Moines* (Iowa) *Register,* Sept. 30, 1981. To check a police claim that Illinois "psychic" Alexander had "demonstrated some success" in crime-solving and body-finding in Iowa, Eagar, a *Register* copy editor, used his newspaper's files to examine what her predictions were and how they stood up.

Time after time she was wrong. A fine example of the type of follow-up article all publications that publish reports of psychics' predictions should do.

Evans, Christopher. "Pentagon Putting Its Mind to Psychic Arms Race." *Minneapolis Star,* Oct. 6, 1981, pp. 1B and 2B. Detailed, skeptical examination of the military's no-joke (but funny nevertheless) top-secret program to attempt to develop "psychotronic" (ESP) weapons. Based in part on interview with Ron McRae, Jack Anderson's associate, who first exposed the program and is researching a book on it.

Gould, Stephen Jay. "Agassiz in the Galapagos." *Natural History.* December 1981, pp. 7-14. Amazed to learn that naturalist Louis Agassiz, the last great scientist-creationist, voyaged to the Galapagos in 1872, Gould resolves to discover what effect this virtually unmentioned trip to the land of Darwin and evolution had on Aggassiz. He concludes that it made precious little impact, because Aggasiz's mind was so committed to creationism that it was not receptive to the subtle signals about evolution. "Scientific discovery is not a one-way transfer of information from unambiguous nature to minds that are always open."

Hunt, Morton. "A Fraud That Shook the World of Science." *New York Times Magazine,* Nov. 1, 1981. An examination of the case of plagiarism and falsified data involving endocrinologist Vijay R. Soman at the Yale School of Medicine.

Lewin, Roger. "A Response to Creationism Evolves." *Science,* 214:635-38, Nov. 6, 1981. Report on the start of coordinated scientific reaction against creationists' anti-evolution tactics. (See News and Comment, this issue.) This was the first of a splendid series of detailed reports by Lewin on the creationism issue and the Arkansas trial. See *Science* issues of Dec. 4, Dec. 11, Jan. 1, Jan. 8, Jan. 22, and Jan. 29.

Lewis, Ralph W. "Why Scientific Creationism Fails to Meet the Criteria of Science." *Creation/Evolution,* Summer 1981, pp. 7-11. Michigan State University biologist concludes that *"scientific* creationism does not exist, and those who say [it does] are being misled by their ignorance of science and their ignorance of the criteria by which scientists decide what constitutes science."

"Magician or Scientist?" *Discover,* December 1981, p. 12. "Skeptical Eye" report on the controversy over the strange "morphogenetic fields" hypothesis of English plant physiologist Rupert Sheldrake. See also the running discussion in many issues of *Nature* throughout the fall of 1981.

Roberts, David. "Heroes and Hoaxers." *Outside,* October 1981, pp. 62-70. Recounting of the considerable evidence that Richard E. Byrd's "first flight over the North Pole" in 1926 in fact never made it to the Pole. From the author's forthcoming book *Great Exploration Hoaxes.*

Steinhart, Peter. "Fundamentals." *Audubon,* September 1981, pp. 5-14. Essay on the creation-evolution dispute and the ethical and environmental consequences of ignoring evolutionary principles.

Zuidema, Henry P. "Genetics and Genesis: The New Biology Textbooks that Include Creationism." *Creation/Evolution,* Summer 1981, pp. 18-22. Examination of biology texts shows how evolution as a topic is slipping away and creationism slipping in as several major textbook publishers accede to creationist pressure in the billion-dollar school market. Followed by a discussion by biology educator Stanley Weinberg of some of the issues raised.

—Kendrick Frazier

Follow-up

Quantum PK Experiments: Reply to Hyman

Ray Hyman, discussing my article "A Critical Analysis of H. Schmidt's PK Experiments" [both articles in Spring 1981 *SI*] takes the opportunity to criticize my general approach to parapsychology. For this purpose he isolates statements made in my article in which I made reference to a fuller discussion given in my book.[1] These are as follows:

(1) *Each experiment must stand on its own feet.* This Hyman states to be "at odds with every contemporary history and history of science account that I have read."

My statement above arose when considering telepathy experiments in which conditions have been changed from one sitting to another. Originally it was in the form: "Each experiment must be considered solely on its own merits. A weakness cannot be excused because it was absent in a second experiment, which may have its own weaknesses; if it has not, the first experiment should be ignored and conclusions obtained only from the second."[2]

The same statement applies to experiments in general. If it had been ignored we would still be considering Rhine's early card-guessing experiments.

(2) *In analyzing an experiment it is wise initially to adopt the assumption that ESP (or in this case PK) is impossible and then see how the result could have arisen through already established processes.*

Hyman would have preferred me to write " . . . it is wise to assume that the initial odds in favor of psi are exceedingly low."

What I originally wrote here was: "The basic problem of parapsychology is relatively simple . . . Either it is possible for at least some people to communicate by extrasensory perception or else ESP does not and cannot exist because the underlying processes necessary for its occurrence do not exist."[2]

I was not concerned with the odds in favor of the one or the other possibility eventually emerging as correct, nor even with the particular beliefs of the reader in this respect, but with considering the two mutually exclusive possibilities.

My statement arose after considering the attitude we adopt when seeing a conjurer saw a woman in half on the stage. I concluded: "Thus, in analyzing an experiment that purports to prove ESP, it is wise to adopt initially the assumption that ESP is impossible, just as it is assumed that the conjurer cannot saw the same girl in half twice each evening . . . If analysis shows that this assumption is untenable

then the possibility of ESP has to be accepted . . ."[3]

In my later account,[4] I extended this discussion, in view of the manner in which my original statement had been misquoted and misunderstood in the intervening years. Hyman has ignored this discussion.

Hyman writes: "He restricts his reason for alternatives completely to deliberate trickery on the part of the experimenter, the subject, or an outsider." But, in my article I referred to my fuller discussion of Schmidt's experiments in which I did not mention the possibility of trickery.[5] The aim in the article was to indicate the possibility of trickery in view of the statements made at the meeting of the American Physical Society. I wished to indicate that in addition to numerous other weaknesses even the "space-age technology" employed by Schmidt was not sufficient to eliminate the possibility of conjuring tricks being employed by the subjects had they wished to employ them. I then indicated the possible ways in which a trick might have been employed by the subjects or the experimenter or some other persons. This was hardly restrictive.

What I wished to convey was that Schmidt's "particular program"—far from introducing "new levels of sophistication in instrumentation, selection, in recording the data, and in theory," as stated by Hyman—fell miserably short of the program employed by the VERITAC team of investigators in 1963 and, in some respects, short of the work at Duke University carried out in the late thirties.

Hyman writes that "only when the parapsychologists settle upon a standardized paradigm" and show "the results can be duplicated in independent laboratories, will we have something that needs explaining." This is so if we assume PK to exist; but 100 years of research have failed to achieve this state of affairs. If quantum processes cannot be affected by human beings so as to produce a particular desired—or not desired—end result in a display of lights, and if Schmidt's PK experiment employed space-age technology to ensure that frequent errors did not arise when counting the numbers of outputs, then I suggest that something does need explaining.

In my 1965 survey of parapsychology experiments I isolated for particular scrutiny those regarded by parapsychologists as "conclusive." These were experiments in which stringent safeguards were claimed to have been taken against experimental error and in which the anti-chance odds obtained were such that it was clear that something had happened to bring about the observed result. For my 1980 account, no such experiments appeared to have arisen during the intervening years. The PK experiment carried out by Schmidt came nearest, however, since over a period of ten days two subjects consistently scored high or low, giving anti-chance odds of 10 million to one. The most likely cause of this result, as discussed in my book, was the fact that there were several unsatisfactory features in the methods employed that could lead to experimental error. But an essential consideration in any experiment—as stated by J. B. Rhine himself[6]—is that it should not be possible for the subject to cheat. In my article I attempted to show that it may have been possible for the subjects, the experimenter, or some outside person to have brought about the result by employing a trick. If that is so, whether the result was in fact due to trickery or not, no further discussion of the experiment is required. But if this experiment is to be advanced as providing evidence for PK, and if it is to be proclaimed in the manner of Hyman as making "many of the earlier criticisms of parapsychological research obsolete," then it is necessary to examine it further in order to account for the findings.

Hyman writes: "The parapsychologists, of course, see Hansel's position for what it is—a dogmatism that is immune to falsification. There is no such thing as an experiment immune from trickery."

Whatever parapsychlogists' or Hyman's interpretation or misinterpretation of my view may be, I would agree. There is no experiment immune from trickery on the part of the investigators. This applies to any experiment in science. But as the result of an experimental demonstration of a phenomenon is confirmed—and very seldom rejected—by an increasing number of independent investigators, the likelihood of the result being an artifact becomes increasingly remote. Failure to confirm, on the other hand, makes it increasingly likely that the phenomenon is bogus.

Over the past hundred years a large number of experiments and procedures have been reported by parapsychologists, not one of which has afforded a reliable demonstration of any supposed paranormal process. Not one of these experiments can stand on its own feet, but Hyman appears to assume that this large number of unreliable experiments taken en masse can provide evidence for the supposed process. Rather, it may be argued that this repeated failure to provide a reliable demonstration indicates that the supposed processes are nonexistent.

Hyman writes that he tries to justify his position "in terms of how well the evidence fulfills explicit standards of reliability and coherence" and that he tries to present his arguments "in such a way that they can be constructive and possibly help researchers to get closer to the truth." What is the truth about Schmidt's PK experiment? Were the two subjects, K.G. and R.R., affecting a random-number generator or the emission of electrons from a radioactive source? Or was Schmidt incapable of accurately recording the result of his tests and checking the readings with a print-out? Neither of these possibilities may apply. Is it not then constructive, and likely to assist researchers to get closer to the truth, to indicate how the subjects, the experimenter, or other persons might conceivably have rigged the experiment? The truth is only likely to emerge if all these possibilities are made apparent and closely examined.

—C. E. M. Hansel

Notes

1. C. E. M. Hansel, *ESP and Parapsychology: A Critical Re-evaluation,* Prometheus Books, Buffalo, N.Y., 1980.
2. C. E. M. Hansel, *ESP: A Scientific Evaluation,* Scribner's, New York, 1966.
3. See Note 1.
4. See Note 1.
5. See Note 1.
6. J. B. Rhine and J. G. Pratt, *Parapsychology: Frontier Science of the Mind,* Charles C. Thomas, Springfield, Ill., 1957.

From Our Readers

The letters column is a forum for views on matters raised in previous issues. Letters are welcome and are more likely to be published if they are typed and double-spaced. Some may have to be edited.

Role of belief

You encourage those of us who support the Committee in its work "to accept the role that unexamined belief plays in society [since this] is only the rational act of accepting the world as it is" (Editor's column, *SI*, Fall 1981).

I agree entirely that we must *recognize* the role that unexamined belief plays in society; we must *mark* that role, and if our own work is to be successful, we must begin it from that marker. But we must *never accept* that role, nor the concomitant view that there is an "innate human need for supportive belief systems."

Man has an inclination to adopt supportive belief systems. The inclination arises out of such things as a need for emotional security and a desire for distinctiveness, which one can acquire quickly by pretending to esoteric knowledge. But, in fact, these needs can be fulfilled, and desires gratified, in other, more productive and ultimately satisfying ways than by making irrational commitments to unexamined belief.

Those of us who support CSICOP must demonstrate, in our own lives to begin with, then through other effective means, that man's real needs can be adequately fulfilled without recourse to mysticism in any of its guises.

Bob MacQuarrie
Yellowknife
Northwest Territories, Canada

Psychics in Illinois

In the past, letters to the editor of *SI* (Fall 1978, Spring 1979, Summer 1979) have noted that it is difficult to get books that debunk the pseudosciences published. I have discovered that it is also difficult to get an anti-psychic *letter* published.

The state of Illinois has been suffering from a psychic infestation on a par with that of the medfly in California. Consequently, when a slightly negative article about the Committee for the Scientific Investigation of Claims of the Paranormal was published in the *Chicago Tribune* last spring, I wrote a pro-CSICOP letter to the editor. When this very brief letter was ignored, I wrote a longer pro-CSICOP letter in which I tried to demonstrate that the ubiquitousness of psychics (to say nothing of other charlatans) made the extreme measures employed by some members of CSICOP a necessity. This letter, too, was ignored.

When the front page of the September 7, 1981, *Tribune* carried an

article stating that an unidentified psychic had helped police find a lost child, I wanted to write a *third* letter but realized it would be futile. I can only suppose that, while the Christians of the world are singing "What a Friend We Have in Jesus," the psychics of Illinois are singing "What a Friend We Have in the Editor of the *Chicago Tribune*"!

Barbara Lazerson
Dept. of Curriculum and Instruction
Illinois State Univ.
Normal, Ill.

Libel and the tabloids

Your Summer 1981 issue mentioned the successful libel suit by Carol Burnett against one supermarket tabloid and the false attribution to a respected academician, by another such tabloid, of a "scientific" endorsement of some mountebank. As a lawyer in Washington, I spent a good deal of effort in a few libel cases and perhaps you might be interested in my observations.

A couple of years ago, one of those noxious tabloids offered its long collection of New Year's Eve "prophecies" for the coming year. One of them named a nationally respected journalist and prophesied that he'd be exposed in the next twelve months for accepting a bribe to keep quiet about some dreadful corruption; the prophecy, as we might expect, went unfulfilled. However, even though couched as a prognostication, it contained the implied accusation that this journalist had *already* accepted the bribe for the coverup and all that the future held was his exposure for so doing. Such an implied accusation, despite its coyness, would probably be a good foundation for a very potent libel suit. There was a similar suit, more than a century ago, for someone who said "I dreamt he stole my horse," and this would only bring the matter up to date.

By the same token, and it has been clearly held in much more recent court cases, falsely attributing quotations to someone, especially quotations that would make him appear ridiculous to his professional clients or colleagues, is undoubtedly libelous. That the person burdened with these invented quotations may be very famous makes no difference; Johnny Carson was able to pound the poop out of a gossip magazine for this sort of thing, even though he appeared to suffer no loss of income for it.

It is very possible that, if the victims of these supermarket swamis were ready to respond in court, messages from the spirit world would adopt a new editorial policy.

Bernard J. Sussman
Washington, D.C.

Tools for thinking

I'd like to compliment *SI* on the splendid article by Sidney Gendin ("ESP: A Conceptual Analysis," *SI*, Summer 1981). It gives us tools for thinking about ESP rather than just dealing with this inconsistency or that fraud.

Keep up the good work. I share my *SI* with a growing number of people, some of whom are delighted and come back for more when they come to the conclusion that they have "been had" in the past.

Anne Hessey
Bronxville, N.Y.

The Committee for the Scientific Investigation of Claims of the Paranormal

Paul Kurtz, Chairman

Scientific and Technical Consultants

William Sims Bainbridge, professor of sociology, University of Washington, Seattle. **Richard E. Berendzen,** professor of astronomy, provost, American University. **Charles J. Cazeau,** associate professor of geological sciences, SUNY, Buffalo. **John R. Cole,** anthropologist, University of Northern Iowa, Cedar Falls. **J. Dath,** professor of engineering, Ecole Royale Militaire, Brussels, Belgium. **Sid Deutsch,** professor of bioengineering, Rutgers Medical School. **J. Dommanget,** astronomer, Royale Observatory, Brussels, Belgium. **Natham J. Duker,** assistant professor of pathology, Temple University. **Andrew Fraknoi,** astronomer; executive officer, Astronomical Society of the Pacific; editor of *Mercury*. **Frederic A. Friedel,** philosopher. Hamburg, West Germany. **Robert E. Funk,** anthropologist, New York State Museum & Science Service. **Laurie Godfrey,** anthropologist, University of Massachusetts. **Donald Goldsmith,** astronomer; president, Interstellar Media. **Henry Gordon,** magician, Montreal. **Norman Guttman,** professor of psychology, Duke University. **Edwin C. Krupp,** astronomer; director, Griffith Observatory. **Richard H. Lange,** chief of nuclear medicine. Ellis Hospital, Schenectady, New York. **Gerald A. Larue,** professor of biblical history and archaeology, University of So. California. **David Marks,** professor of psychology, University of Otago, Dunedin, New Zealand. **Joel A. Moskowitz,** director of medical psychiatry, Calabasas Mental Health Services, Los Angeles. **Robert B. Painter,** professor of microbiology, School of Medicine, University of California. **John W. Patterson,** professor of materials science and engineering, Iowa State University. **Steven Pinker,** assistant professor of psychology, Harvard University. **James Pomerantz,** assistant professor of psychology, SUNY, Buffalo. **Robert H. Romer,** professor of physics, Amherst College. **Milton A. Rothman,** professor of phy sics, Trenton State College. **Robert J. Samp,** assistant professor of education and medicine, University of Wisconsin-Madison. **Stuart D. Scott, Jr.,** associate professor of anthropology, SUNY, Buffalo. **Erwin M. Segal,** professor of psychology, SUNY, Buffalo. **Elie A. Shneour,** biochemist; president, Biosystems Assoc., Ltd., La Jolla, California. **Barry Singer,** associate professor of psychology, California State University, Long Beach. **Gordon Stein,** physiologist, author; editor of the *American Rationalist*. **Robert Steiner,** magician, El Cerrito, California. **Waclaw Szybalski,** professor, McArdle Laboratory, University of Wisconsin-Madison. **Ernest H. Taves,** psychoanalyst, Cambridge, Massachusetts.

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The Committee for the Scientific Investigation of Claims of the Paranormal

The Committee for the Scientific Investigation of Claims of the Paranormal attempts to encourage the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view and to disseminate factual information about the results of such inquiries to the scientific community and the public. To carry out these objectives the Committee:

- Maintains a network of people interested in critically examining claims of the paranormal.
- Prepares bibliographies of published materials that carefully examine such claims.
- Encourages and commissions research by objective and impartial inquirers in areas where it is needed.
- Convenes conferences and meetings.
- Publishes articles, monographs, and books that examine claims of the paranormal.
- Does not reject claims on a priori grounds, antecedent to inquiry, but rather examines them objectively and carefully.

The Committee is a nonprofit scientific and educational organization. The SKEPTICAL INQUIRER is its official journal.